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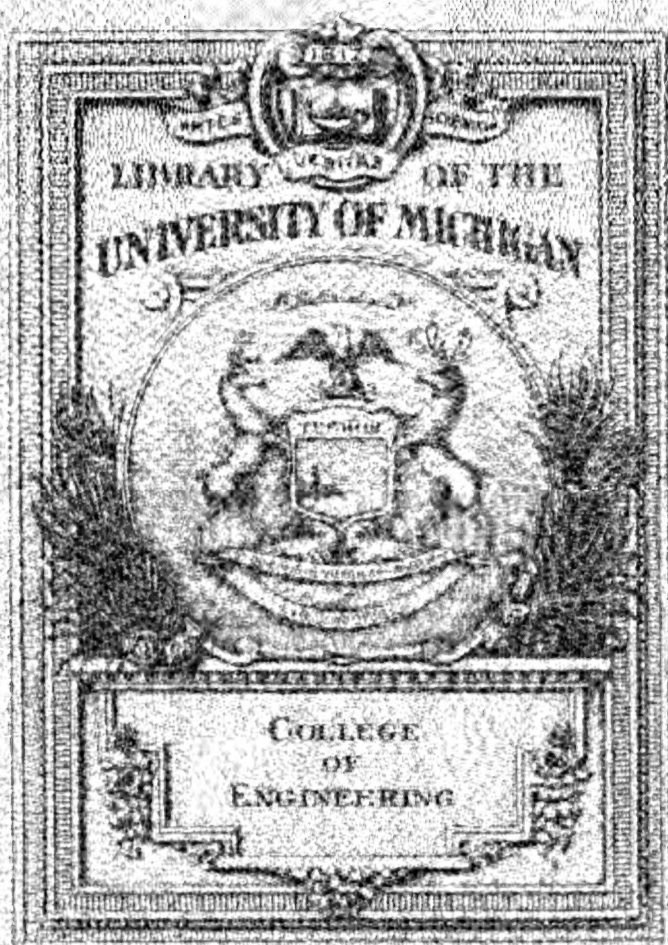
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How to
Abandon Ship



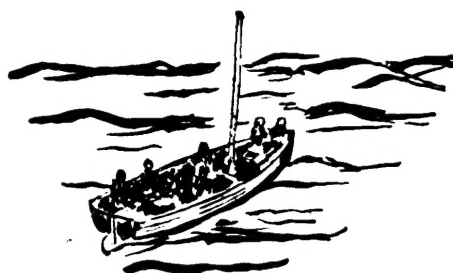
John J. Banigan, co-author of this manual, is first on the right in the Robin Meer lifeboat he commanded. This picture was taken on the tenth day of their 13-day voyage. (*International News Photos*)



How to ABANDON SHIP

by

Phil Richards John J. Banigan



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Phil Richards
John J. Banigan

June, 1942

Contents

“IT CAN’T HAPPEN TO ME”	ix
SIGNALS	xii
INTRODUCTION	3
1. PREPARE YOURSELF	9
2. ABANDON SHIP	19
3. BUOYANCY	29
4. SWINGING OUT	34
5. LOWERING	38
6. WATERBORNE	42
7. SETTING SAIL	48
8. OPEN BOAT SEAMANSHIP	55
9. NAVIGATING	62
10. TRANSPORTS	68
11. LIFERAFTS	73
12. TANKERS	79
13. MEDICAL	87
14. MORALE	101
15. WATER AND THIRST	110
16. FOOD AND HUNGER	116
17. WIND AND RAIN	124
18. FREEZING WEATHER	132
19. SHIPBOARD PRECAUTIONS	141
20. LOOKOUT	148

21. ENGINE ROOM	152
22. TANKER SAFETY	155
23. TROPICS	158
24. DEVICES AND EQUIPMENT	165
25. FACTS AND FIGURES	175
ABSTRACT OF BANIGAN'S VOYAGE	182
INDEX	187

“It Can’t Happen to Me”

At sea you feel safe. You have none of the doubts which troubled you ashore. The surroundings are familiar, the days uneventful, the watches repetitious. The war seems very remote. You can’t work up any sense of danger. There is no tension, no grimness. You say to yourself: “It can’t happen to me.”

That becomes a hypnotic slogan. It lulls you into apathy. You slide through lifeboat drills. You yield to a false sense of security.

“It can’t happen to me.”

Planes circle your convoy. Destroyers and corvettes shuttle back and forth. Elsewhere the U-boats are being massacred. They are no longer a major threat to the Allied supply lines.

That is right. But presently you learn something. You learn that the submarines *are* a major threat to the individual. You are brought to realize that until the war is over, the U-boats will hold the threat of death out to every man and woman crossing the oceans.

Your ship breaks down. Or perhaps heavy weather scatters the convoy. No planes or escort ships now. So a periscope pops up.

What happens? Let a few of 1943's survivors tell you. Let them explain how the It-can't-happen-to-me attitude backfired.

"No orders were given and the result was that lifeboats were overturned from crowding."

"The captain lost his head, and was the first one into a lifeboat."

"Some of the officers didn't stay on the ship to insure the safety of the rest of the men."

"Only the third mate stood by his post and gave the orders for lowering of his boat, which was the only one that got away."

"The decks were raked with machine-gun fire. They started pumping five-inch shells into the ship. The whole ship was ablaze on the starboard side. We were waiting in the alleyway for orders to abandon ship. Orders never came."

There are many deaths behind these statements, the unnecessary deaths outnumbering the unavoidable deaths more than three to one.

Realize that it does not take Hitler's 500 U-boats to wage warfare that is deadly to the individual. The figure is impressive; but more impressive is the little group of master undersea strategists, German submarine commanders who have done most of the destruction.

Two Nazi U-boats each have sunk 750,000 tons of Allied shipping, the total tonnage equal to 150 ten-thousand-ton freighters. Computing from the averages, these two U-boats took the lives of 1170 men—270 by direct hits. What killed the other 900?

"It can't happen to me!"

SIGNALS

FIRE AND EMERGENCY—Rapid ringing of the ship's bell and continuous ringing of general alarm bells for at least 10 seconds.

ABANDON SHIP —7 short blasts and 1 long blast on the whistle and the same signal on the general alarm bells.

MAN OVERBOARD —Hail, and pass the word "Man Overboard" to the bridge.

DISMISSAL —3 short blasts on the whistle and 3 short rings on the general alarm bells.

SIGNALS FOR HANDLING BOATS

LOWER BOATS —1 short blast on whistle.

STOP LOWERING—2 short blasts on whistle.

DISMISSAL —3 short blasts on whistle.

ADDITIONAL SIGNALS

.....
.....
ARTICLE NUMBER
LIFEBOAT NUMBER
LIFEBOAT STATION
LIFERAFT STATION
FIRE STATION
EMERGENCY SQUAD STATION
SUB ATTACK GUN STATION
AIR ATTACK GUN STATION

NOTE: The number of the line on which you signed the articles is your number on the station bill. Guard against confusion. Write down all the details concerning signals, and your fire, boat, and gun stations as soon as the station bill is posted.

How to
Abandon Ship

Introduction

This manual is concerned solely with human lives. Its purpose is to aid you to get off a sinking ship and to eventual safety in the best condition possible.

The time has passed when you can indulge in boat-drill lethargy, when you can fiddle with a rope or two, while you "let George do it." When a torpedo hits, "George" may prove to be even more panicked and less skilled in launching a lifeboat than you, and it may be that he is depending on you to get him safely off the sinking vessel.

Remember that after this war many sunken vessels will be salvaged. But there will be no salvaging the two messmen on the torpedoed tanker *Republic*, who were drowned when they jumped overboard from a ship that did not sink. There will be no salvaging of the *Pan-Massachusetts* seamen who launched a lifeboat into burning oil slick, or the *City of Atlanta* crew, whose lifeboat, even on the low side, capsized in lowering, costing the lives of eighteen men. Nor will pontoons resurrect the *Allan Jackson* men who were

cremated alive within the sheet of fire spreading over the water around their stricken tanker.

Four men on the torpedoed *Malay* died for want of knowledge they could have acquired in ten seconds. They cast off the forward fall first and were flung into the sea. The crew of the Belgium freighter *Gandia* was twenty-six days in a lifeboat. During that time twenty-four men died—because they were not ready for an emergency before it arose.

Within sixty-six hours after the torpedo struck, seventeen men from the Norwegian freighter *Blink* went mad and died. The cause of their death is recorded as exposure. Actually they died for lack of preparation.

Compare the *Blink* tragedy with the case of another Norwegian freighter, the *Nybolt*, torpedoed in the North Atlantic. For nine days during January the survivors were in an open boat. On the eighth day heavy spray covered the boat with an inch-thick layer of ice.

Arne Egenes, surgeon of the *Nybolt*, reported: "In my lifeboat there were twenty-four men. Out of these, twenty-two wore life suits. The two not using the suits were the captain and second mate. The captain died of exposure, and the second mate had to have both legs amputated on account of frostbite."

Most casualties at sea are actually the result of

panic, which is the product of ignorance. In a life-or-death emergency you are not going to be entirely free of panic. But you will be able to cut down the fatal intensity of panic if you have previously applied what is offered in this manual to the peculiar circumstances of your own ship and follow these simple don'ts:

Don't depend on peacetime experience and regulations. Keep your eye out for recent and current bulletins issued by the Marine Inspection Service, which has gathered a large amount of data and from it proposed many improvements and changes in safety and lifeboat regulations. Moreover, peacetime regulations do not prevent the operator from acquiring all the safety gear he wants, and the Marine Inspection Service earnestly urges that he secure additional equipment before he is required to do so.

Don't depend on what is in the lifeboat.

Don't stint yourself on safety gear for your own protection. Steamship operators are like all other businessmen—except for providing five thousand dollars insurance on each seaman, from the captain to the messboy—and they wish to keep expenses at a minimum. So if the steamship operator does not do the supplying, you yourself do the buying. A few dollars from your pocket may mean all the difference between your becoming a 1943 casualty or a 1983 veteran.

Don't let human nature trick you into indifference. A man will readily pay for comfort and a good appearance; but he is reluctant to part with dollars to protect his most precious possession—his own life. The reason for this indifference is plain. He is constantly aware of the benefits of comfort and a good appearance, but death is beyond his experience. He cannot identify himself with it. Death is something that happens to the other fellow.

We earnestly advocate that American seamen urge upon their Congressional representatives and seamen's organizations the advisability of equipping every ship with at least one pair of skates.

A skate is a curved iron, with a narrow edge or runner, which follows the line of the lifeboat from gunwale to keel. The inner part of the skate has a wood lining which fits snugly against the strakes—or fore-and-aft planking—of the boat, and serves to cushion impacts against the ship's side during a launching. The upper part of the skate clamps over the gunwale and the lower part hooks around the keel. The skate is secured on the gunwale either with wooden wedges or fastening screws.

Skates will enable you to launch a lifeboat down the high side with as much as a 46-degree list. Skates protect a lifeboat from being stove in

against the side of a rolling ship. Skates eliminate the possibility of a lifeboat capsizing because of extending gangway fittings, rims, bolts, port-holes, or plate edges. Forty thousand merchant seamen were killed in World War I. Skates could have saved thousands of them.

This manual is the result of open boat experience in the time of stress, danger, and sudden death. It contains no armchair theory. It is a digest of the lessons learned by the survivors of torpedoed ships.

John J. Banigan, the co-author, was an officer on the *Robin Moor*, the first American vessel sunk by a Nazi torpedo. For nineteen days in a twenty-six foot lifeboat, Banigan and his crew of ten encountered mountainous seas, tropical storms, doldrums, and blistering equatorial sun. They traveled 898 miles. Yet when they were picked up by the Brazilian freighter *Osorio*, every man was in good condition.

Prepare yourself adequately and, barring a direct hit, you will end up in this war in as good condition as the *Robin Moor* survivors.

Phil Richards

New York City
June, 1942

1. Prepare Yourself

The *Harry F. Sinclair, Jr.* was still afloat and burning a week after she had been torpedoed. Her fo'c'sle was free from flame. Yet men were burned to death because they jumped overboard, and they jumped overboard because they were not prepared.

William Caves, the bosun, safe in a water-borne lifeboat, saw an A. B., who had leaped over the side, struggling in a sea of flaming gasoline. It was impossible to reach the man. Caves saw his shipmate suck fire into his lungs. The A. B. was still fighting while he was being cremated. Then his head nodded briefly as though he were dozing, and Caves watched the charred body float deeper into the flames.

A needless death. The A. B. died because he had no faith in his own seamanship. He did not know the simplest fundamentals of buoyancy. (See Chapter 3.) He did not know the treachery of a cork jacket, which is scarcely more of a safety device than a strait jacket.

ADEQUATE DRILLS.—Do not cheat yourself of life the way this tragic seaman did. Prepare

yourself, which cannot be done simply by engaging in peacetime boat drills. You are not a lifeboatman unless you have had experience in lowering away. Swinging out is not sufficient. As a boat drill, the mere operation of swinging out has left men inadequately trained, resulting in the loss of many lives during emergencies.

The *Comal Rico* crewmen were prepared. They held a boat drill every other day. When the ship was torpedoed, all survived except two who were killed by a direct hit.

Do not ship out unless you have taken part in a complete abandon-ship drill. Insist on this drill. Joe Melendez from the torpedoed *Saber* reported: "In the nineteen days since we left New York there had been no lifeboat drills." Do not let this situation occur aboard your ship. Complete drills can take place in harbors and when coastwise ships lay up at night and even at sea.

Frank W. Ferguson reported: "I was on the torpedoed *E. M. Clark* as A. B. There were 26 men in my lifeboat and of this number only three were completely familiar with handling a boat. Because of this fact we had a tough time getting clear of the ship."

More drills, more survivors.

LIFE SUIT.—Provide yourself with a life suit. It will protect you against wind, rain, spray, and

cold. You can sleep and work in a life suit. In the water it will enable you to get out of the danger area more quickly. It is fire-resisting for at least three minutes. Unless the suit is torn, it will prevent blood from a body wound getting into the water and attracting sharks. The dark color itself will lessen the danger of a shark attack. If the wearer is also clothed in heavy woolen underwear and takes care to keep his circulation active, a life suit will cut down the danger of frostbite and all but eliminate the possibility of death from exposure.

When the *Independence Hall* foundered off Sable Island, the vessel split in two, and a heavy sea prevented the launching of lifeboats. Ten men were lost. Reported Vincent A. Slivjak: "If these men had life suits, their lives would have been saved."

Captain Erling Vorberg, master of the torpedoed Norwegian motor tanker *Barfonn*, reported: "The boatswain, wearing the life suit, was washed into the sea by the first explosion. Due to the weight of the boots, he was kept floating in a standing position by the kapok jacket, even though he was unconscious."

Of the other crewmen who jumped overboard wearing life suits, Vorberg reported: "They were floating around in the water like rubber balls

and could easily swim and advance with a rather good speed. When they were picked up in the lifeboats, they were all dry and warm."

In the same convoy, all the men aboard the *Ila* were lost. They did not have life suits. Only two men were saved from the 30 aboard the Greek ship *Evros*. They did not have life suits.

R. G. Wallace, a watertender from the torpedoed *Collamer*, reported: "One man was standing on the poop deck when the well deck was already under water. If this man had a life suit, he would be living today.

"A man was adrift on an old crate, and as close as we could maneuver the boat was ten feet. We asked him to jump, but he was afraid to do it, and after we drifted away, we heard his cries for a while, but then they were silenced."

INSPECTION.—Inspect the equipment and provisions yourself. Do not take anything for granted. Three days at sea an A. B. aboard the *Jupiter* discovered that the water tanks in four liferafts were dry.

John Larson, A. B. from the torpedoed *Allan Jackson*, reported: "The turnbuckles were frozen and it took anywhere between five and ten minutes to release the gripes."

Julius L. Schwartz from the torpedoed tanker *China Arrow* reported: "Two of the lifeboats

had no rudder. The #3 lifeboat was without water."

Do not forget to inspect the screws which hold the mast step in place. In old boats these are sure to be badly rusted. The *Prusa's* #1 boat nearly capsized when the step pulled loose at night while the boat was under full sail.

One of the breakers in the *Prusa's* #1 lifeboat contained a top layer of fresh biscuits, but the balance of the contents was old and moldy.

(See page 136 for taking care of boat cover and water breakers in freezing weather.)

FIRST-AID.—Ashore, you should take a course in first-aid; at sea you should practice what you have learned. You should provide yourself with a first-aid manual.

CLOTHING.—Whether you are bound for the Tropics or the Arctic regions, supply yourself with heavy woolen underwear.

CORK PRESERVERS.—Do not trust your life to a cork preserver. Men have drowned in them. This type of preserver rides high on the wearer's back, and sometimes it actually forces the head under water. Men who have jumped overboard wearing cork preservers have had ribs, arms, and shoulders broken. The front of the preserver strikes the chin, knocking the wearer unconscious.

Albert Pfisterer, a wiper from the torpedoed *Gulf America*, reported: "We saw bodies in the water, face downwards and feet up. This was the fault of the life preservers. The men could have been saved if it were not for the life preservers crawling up."

The bosun of the *Casper*, which sank in the Baltic Sea years ago, advised that a piece of nine thread be used to lash the cork preserver around the body to keep it snug and low.

SHIP'S MEETINGS.—John J. Smith, veteran pumpman from the torpedoed Pure Oil tanker *E. W. Hutton*, strongly advocates ship's meetings. Though Smith's ship was torpedoed twice, and men were killed by direct hits, there was an absence of panic among the crew. The discussions aboard the *E. W. Hutton* had much to do in aiding the men, when the emergency came, to keep their heads.

The meetings included the entire crew, divided into two off-watch groups. Besides these meetings, a committee composed of one representative from each department conferred with Captain Carl Flaathan on safety measures.

It was agreed that if no officer were present to take command, the first capable man to reach his lifeboat station, regardless of his rating, was to act as the leader until relieved by a licensed officer. It was also understood that once

launched, the lifeboat was to remain nearby until it was certain all survivors had been picked up from the rafts and the water.

The discussions should take place under pleasant circumstances. If dwelling on the subject of abandoning ship causes the men to grow fidgety, discontinue the discussions for a day or two.

TEXTBOOK.—It is suggested that you use this manual, which has been written out of the sweat and blood of actual experience, as the textbook for your meetings. For instance, read Chapter 3 on *Buoyancy*, and then ask the captain or chief engineer to explain the buoyancy conditions of your own vessel. After this discussion it is likely that you will be able, in an emergency, to put down any impulse to jump into flaming oil slick or icy water or a shark-infested sea.

DEMONSTRATION.—Thirty-one survivors escaped in a 28-foot lifeboat from the torpedoed *City of New York*. Because of the boat's crowded condition, John Adams, the carpenter, could not get to the mast, and those around it were unable to rig the sail. One adequately trained lifeboatman among 31 persons! The sail had to be passed back to Adams for him to bend on. Then Adams had to shout instructions on how to step the mast.

It is vitally important that the crew—particularly the new seamen, the Black Gang, and those

in the steward's department—learn by practice and demonstration the seamanship required in handling a lifeboat. The proper distribution of weight in the lifeboat should be demonstrated, to emphasize the importance of maintaining a low center of gravity. Every one not trained in navigation should read Chapter 9 on *Navigating*, and practice shaping courses on a Pilot Chart—before the need to do so arises.

ORDINARIES.—It has been the experience of veteran seamen at ship's meetings that the youngsters are inclined to grin. Consequently the old-timers are equally inclined to drop the discussions. Yet a foolish grin does not make a person's life any less precious.

Actually these ship's boys are grinning to cover their embarrassment, to hide their sense of inadequacy. Perhaps some of them are even incapable of comprehending danger before it reaches them. Whatever the reason, the real seamen are not to allow an irresponsible attitude to affect their zeal in passing on the benefits of their experience.

MORALE.—B. A. Baker, the *Prusa's* third mate, advises: "The most important thing for any lifeboatman to do, is to school his own mind. Make up your mind not to get excited and stick to it. Don't say you won't be afraid, for you will. When the torpedo explodes you will get a

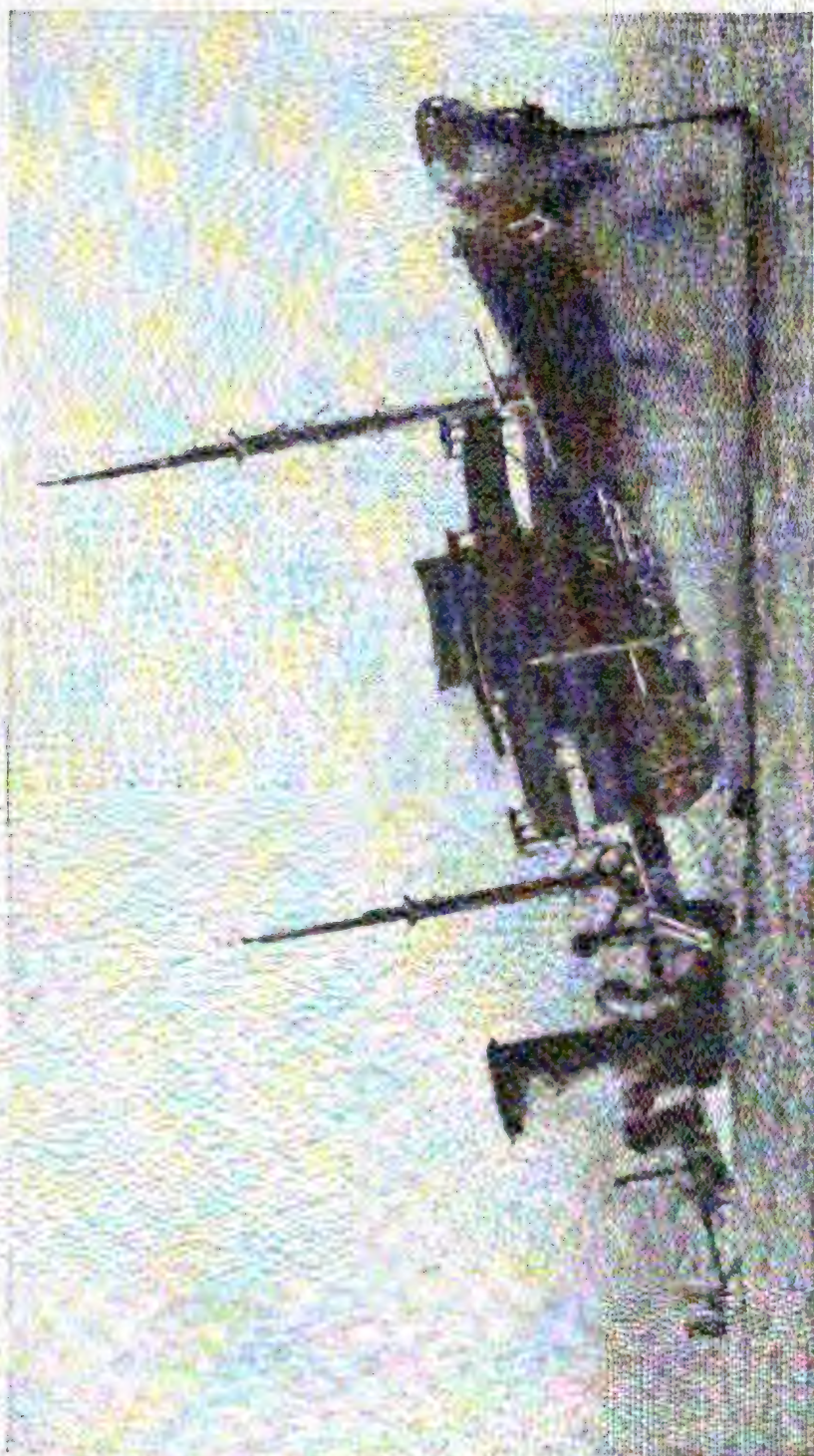
sinking sensation in the pit of your stomach, and your knees may become a bit weak. The best cure for this is action."

SLACKNESS.—When you review the statistics regarding marine disasters, it is difficult to understand how there ever could be any slackness in lifeboat drills. Yet many a seaman can tell of attending hundreds of drills without once having a chance to lower away and handle a water-borne boat.

Arthur LaBarge, an oiler aboard the *Oneida*, reported on a North Atlantic trip in March: "No lifeboat drills during the entire voyage, going or coming."

Even in peacetime an average of 1100 ocean-going ships are lost each year. But in wartime Great Britain alone lost three ships a day during 1917, and 2,479 British merchant vessels went down during the first World War. During April, 1917, the number of Allied and neutral ships which were sunk totaled 430. The first two weeks of World War II saw 27 British merchant ships go under. In 1917 sixteen British merchant ships were sunk in a single day. Arnauld, a German U-boat commander, using one 4-inch gun—no torpedoes—sank during three weeks of August, 1917, 50 sea-going vessels.

•



When a vessel goes down slowly by the head or by the stern, there is not apt to be any suction. (*International News Photos*)

2. Abandon Ship

Do not rush. Sudden sinkings have been rare. But casualties brought about by panicked men dashing needlessly into peril have been frequent.

Fourteen men were saved out of the torpedoed *Naco's* crew of 42. Walter Swank reported: "The men who kept cool and used their heads were those who managed to be saved."

If Ernest Cartwright, one of the three survivors of a freighter shelled more than fifty times, had rushed to get into the port lifeboat, he would have lived less than two minutes. Before they could reach the water, the men in that boat were killed by shellfire.

With no alternative, Cartwright dived overboard. In the waterborne starboard lifeboat he found six more shipmates, four of them dead. These men had *rushed* to their death. They had been unable to pause long enough to choose the lesser risk, which was to remain aboard. The freighter itself did not sink for two hours—long after the U-boat had ceased firing.

The chief mate of a torpedoed Panamanian freighter, Hawkins Fudske, entered a lifeboat

too soon and was killed by an exploding shell. Yet the men were able to reboard their ship the next day and take her into Mobile, Alabama.

Captain Frank C. Girardeau and all but nine of his men were able to reboard their abandoned ship, after a night spent in the lifeboats, and have her towed into port.

SUCTION.—A slowly sinking vessel may submerge without creating a suction. Vincent Halliburton, from the torpedoed *Ceiba*, reported: "While standing on the boat deck, I felt the ship disappear from under my feet. I started to swim and I picked up a raft."

Few men caught within the suction area of a swiftly sinking ship, except those wearing life suits, have survived.

Hans Sundby, carpenter from the torpedoed Norwegian freighter *Erviken*, reported: "I had the guy to the davit across my shoulders and this prevented me from swimming and caused me to follow the vessel downwards. When I got so far down that I found a terrific pressure against my head, especially the ears, I got free from the wire. I shot up with tremendous power. The suit saved my life by bringing me so quickly to the surface on account of the air trapped inside it."

MAN OVERBOARD.—Do not jump into the water. Unless, like Ernest Cartwright, you have

no alternative, or you have to do so to reach a liferaft. If you are wearing a lifejacket containing cork, you are in danger of breaking a rib or your collar bone.

A seaman jumped overboard from the freighter on which Fudske lost his life, and was killed by a shark, though the vessel reached port with forty-two men.

FIDLEY GRATING.—A man aboard the torpedoed *Collamer*, on watch below, lost his life because of a permanent grating on the fidley skylight.

ENGINE ROOM LADDERS.—Rudolph C. Wellmann, second assistant, suggested: "Rope ladders should be hung in the engine room and fire-room so that men will know their location and be able to escape if the regular ladders are blown away."

EMERGENCY ESCAPES.—Thoroughly acquaint yourself with the emergency escapes. Four men on the *Prusa* were lost because they forgot about the emergency escape through the steering engine room. A steam line was severed in the regular passage, making it impossible to leave that way. Yet these men, who were seen in the quarters alive and apparently uninjured after the explosion, had only to go through the steering engine room up through a manhole onto the poop deck, as two other men did.

22 HOW TO ABANDON SHIP

BRATTICE CLOTH.—For years brattice cloth—non-inflammable—has been used by miners to shut off a tunnel in the case of fire or a drift when about to shoot a heading. It is now being purchased for many ships, and is of service in partitioning off open alleyways to prevent the passage of flame.

Discuss the feasibility of making a large wind-sail of brattice cloth to surround the Jacob's ladder leading up from the engine room to the skylight.

LIFE SUIT.—Hans Sundby of the *Erviken* reported: "The engineers at work had made the mistake of having their suits in their cabins instead of the passage to the engine room."

SEAWORTHINESS.—Be sure your lifeboat is seaworthy. This may seem needless advice. Yet in the past bottoms have come out of many lifeboats. One lifeboat of a United Nations freighter, torpedoed 200 miles from Bermuda, leaked so badly that for eleven days the men were unable to stop bailing.

EQUIPMENT.—Do not take it for granted that all the equipment required by law is in your lifeboat. Norman Leo Sampson, the third assistant of a torpedoed freighter, reported that nine of his shipmates were trapped in a lifeboat with no oars. The boat drifted into a sea of blazing oil.

WHISTLE.—Every man should have a whistle

made fast around his neck, so that if he is in the water, he can blow the whistle to draw attention.

A severely burned British seaman from a torpedoed gasoline tanker was on the keel of an overturned lifeboat for five days. He was washed off five times, chiefly at night. Since he had a whistle, his shipmates were able to locate him, otherwise he would have been lost.

LIFE LIGHT.—Life lights are manufactured for both jackets and life rings. With good visibility these lights will provide a possibility of attracting rescuers within a radius of at least four miles. Within the visibility range of shore, they offer a three-way chance of drawing attention—from land, sea, and air.

ABANDON-SHIP PACKAGE.—If you are on watch, you should have your life suit, extra clothes, and abandon-ship package with you, so you will not have to lose time returning to your quarters.

WIRE BASKET.—Have the ship's wire baskets or stretchers easily accessible, so that injured persons may be lowered to a waterborne lifeboat. A wire basket may save a simple break from becoming a compound fracture, with its resultant gangrene and possible death.

PAPERS.—After signing the ship's articles, place your papers and valuables in a deposit box

ashore. This will relieve your mind of any concern for their safety.

The officers should leave their licenses remaining in the frames aboard ship.

CLOTHES.—Do not sleep undressed. Vincent Santiago, A. B. aboard the *Leslie*, slept almost the entire trip with his clothes on. The first night he took his clothes off, the *Leslie* was torpedoed. For three months McPherson, second mate of the *Exminster*, wore his clothes to bed. The first night he donned pajamas, the *Exminster* was torpedoed.

Even in the tropics have cold-weather clothes in your abandon-ship package, or ready to put on without delay. During five hours of drifting, eleven men clinging to liferafts from the stricken U. S. destroyer *Jacob Jones* succumbed to the cold and slipped into the sea. Yet George Pantall and Thomas Ryan Moody survived. They each had the judgment to don three extra suits of heavy winter underwear.

When a tanker, of which Captain Theron P. Davenport was the master, was torpedoed off the coast of Georgia early in April, the crew had ample time to gather their gear before abandoning ship. Yet most of the men neglected to take along sufficient clothing. Consequently, during the ten hours they were adrift, many of them were severely and needlessly sunburned.

OILSKINS.—Two men, at least, should bring along oilskins. They will be of vital use to the men on watch.

EXTRA FOOD.—You should provide a means to open the potato locker quickly. Get a sack of potatoes in your lifeboat, and a sack of onions, if possible, or turnips. Because of their high water content, these vegetables will serve a double purpose in your rations. Canned tomatoes are important. Do not pass up the bottles of jam. The sugar in them will provide energy.

Emergency provisions should be stored in many small watertight containers rather than in one large one. This will lessen the chance of losing your supplies through a container being punctured by shot and the contents being destroyed by salt water.

OTHER EQUIPMENT.—

Jackknife. Do not neglect to take along a knife.

Flashlight. If you have a flashlight and batteries, take them with you. The *Robin Moor's* boat had four torches, in addition to the one required by law.

Rosendo Ramos from the torpedoed *Republic*, reported: "If each man had a flashlight for use after the lights went out, he could probably have found other ways of escape after the ladder was broken."

Mason Jar. A Mason jar will keep your matches and other small items dry.

Toilet Paper. Take a roll with you.

Flare Pistol. Be sure your lifeboat is equipped with a flare pistol.

Rockets. If time permits, get two or three of the rockets which are stowed on the bridge.

PLUG.—So no one will have difficulty finding the plug, mark it—PLUG. Paint an arrow in white pointing to it.

GREENWICH TIME.—If possible, set your watch to Greenwich time. The mate in your boat may not have a chance to set his watch. He will not be able to calculate longitude with any accuracy without Greenwich time when taking sights.

ORDERS.—Get your orders from the mate. But if you are on your own, be sure to get one boat into the water. That can take care of a freighter's whole crew.

PANIC.—Night puts an added burden on you and you must take extra precautions, because at night there is sure to be more panic than in the daytime.

TIME.—The experience of B. A. Baker, the *Prusa's* third mate, will give you a gauge by which you can judge your own time in an emergency. After she was torpedoed, the *Prusa* sank in exactly nine minutes.

Baker was asleep when the torpedo hit. He went to the bridge and got his sextant, chronometer, and navigation books. He stowed them in the boat and helped lower the boat. Then he went back and tried to get the radio operator to leave. Returning to his room, he obtained a sweater, and then jumped overboard. He swam about 200 feet to the lifeboat. The *Prusa* sank as he was being pulled into the boat.

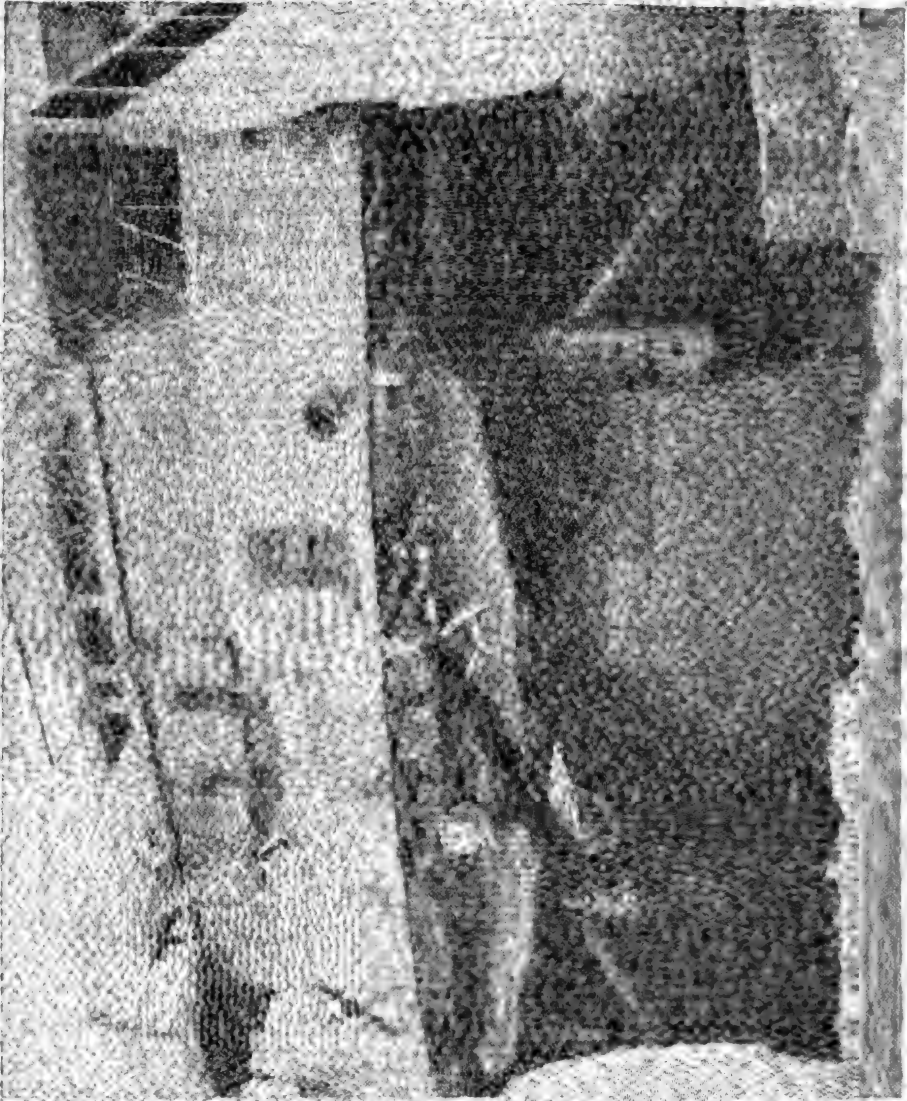
SELF-CONTROL.—If you find yourself being overcome by weakness—having “butterflies in your stomach”—sit down or crouch for a few moments. This is almost a sure-fire method to aid you in getting control of yourself.

BULLET-HOLE PLUGS.—Each lifeboat is supplied with bullet-hole plugs, but stove bolts and nuts, used with candlewicking, also serve the purpose. Take along a bundle of rags to be used with the plugs.

ALCOHOL BURNER.—Take along some canned heat. Then if your water supply becomes frozen, you can thaw it out.

SALT-WATER SOAP.—Take along a bar of salt-water soap.

LIFE PRESERVER.—If you are wearing a heavy coat, do not put a life preserver on over it. Put the preserver on under the coat. Then, if necessary, you can slip the coat off, and still have the protection of the preserver.



The forward section of the 11,600-ton tanker, *E. H. Blum*, split in two either by torpedoes or mines, presents a vivid example of buoyancy. A salvage crew towed this section to Norfolk, Virginia. The 300-foot after section was raised from 32 feet of water and brought to port, where the two parts have been welded together. *Admiral*

3. Buoyancy

Do not jump overboard unless you have no alternative. That is what this explanation of buoyancy—the power to keep afloat—is intended to impress upon you.

For a vessel to stay afloat, the upward pressure of the water must be equal to the downward pressure or weight of the vessel. However, because a ship is torpedoed, it does not necessarily follow that the balance of opposing pressures is going to be so altered that the ship must sink. Four men on the torpedoed tanker *Malay* were unable to consider this, and they lost their lives, though the *Malay* itself made port safely.

A vessel is composed of several units. Each hold, as well as the fireroom and engine room, is an *independent* buoyant section.

Picture in your mind a small freight vessel. Visualize each hold as being detached from the other. Each, as you picture it, is now floating independently. The engine room and fireroom, you will see, are floating deep. The #1 and #4 holds are not quite so deep. The #3 hold has less draft, while the #2 hold has the least depth of all.

The sums of all these individual buoyancies make the total buoyancy of the vessel.

Though the tanker *E. H. Blum* was broken in two by a torpedo, the forward half still had sufficient buoyancy to permit it to be towed to port.

Captain Theodore Bockhoff understood the buoyancy set-up of his stricken freighter after it was hit by a torpedo. That is why he ordered Seaman James Sherlock, who was running for the starboard boat, to wait. A few moments later, as the starboard lifeboat reached the water with six men in it, a second torpedo blew it to bits.

When the torpedoed tanker *Gulftrade* broke in two, nine men were on the stern. Seaman Leonard Smith wanted to jump overboard. Guy F. Chadwick, the chief engineer, reminded Smith that the water was cold. "Let's stick with the ship," Chadwick advised, "as long as she'll stick with us." At the very least, the chief's understanding of buoyancy spared a man from exposure and frostbite.

Suppose the vessel is loaded with lumber, and a hold is stove in. Since the specific gravity of wood runs from one-fifth to a slight fraction beyond that of water, the only loss is in the reserve buoyancy, as the lumber's buoyant qualities will substitute for the loss of actual buoy-

ancy. The space which the sea can occupy is only the area not already taken up by the lumber.

Often, when only one or two buoyant sections are immediately damaged, the vessel *eventually* sinks. The *China Arrow*, torpedoed twice, took an hour to sink. This was probably due to the fact that while the destruction of tanks in the vicinity of the blasts was not enough to sink the *China Arrow*, the detonations sheared plates and loosened rivets in the tanks beyond. Buoyancy is often lost on tankers when heat from the oil blaze buckles the plates. Our point is that it takes time for this buoyancy to be lost.

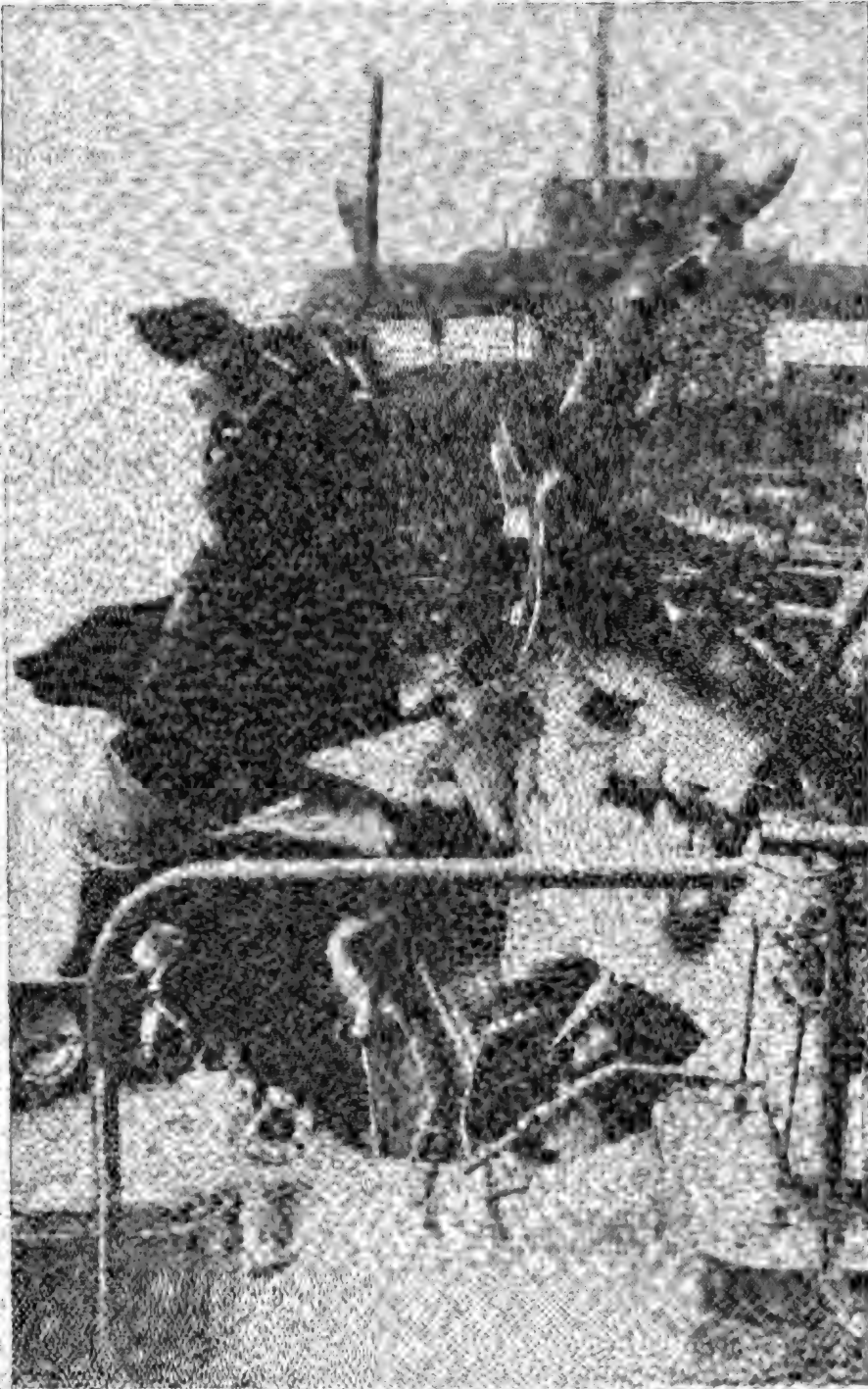
This is borne out by the Latvian freighter *Ciltvaira*. After abandoning ship the men were able to go back, run up SOS flags, and salvage valuables. Captain T. R. Hennevig returned to his crippled freighter eight hours after it had been torpedoed and shelled. A sugar transport vessel, torpedoed off Nuevitas, Cuba, remained afloat and was beached, though 22 crewmen died when lifeboats were sunk by gunfire.

A hold stowed with general cargo presents a serious condition. All the buoyancy of that hold would be lost. Grain cargo likewise adds a threat to a stricken vessel. Expanding from absorbed water, the grain will exert pressure on the water-tight bulkhead and loosen rivets.

32 HOW TO ABANDON SHIP

In short, experience and the laws of physics indicate that men usually have more time to abandon ship than they allow themselves. However, statistics are often contradicted by an individual situation, so don't let them lull you into carelessness. Ships have sunk in five minutes or less.

For your protection discuss with the mates and engineers the buoyancy problems of your ship. And before you jump, remember that Bryan Lloyd, a seaman, had time to swim back to his ship from a swamped lifeboat, rest five minutes, and release a liferaft. Captain Knut O. Bringedal was able to return to his torpedoed vessel three times. And the tanker *Esso Bolivar*, with water ballast, was towed into port with a 40-foot hole blasted in her side.



This old-type tanker made port under her own power. (Official U. S. Navy photograph—*International News Photos*)

4. Swinging Out

Swinging out is a simple process on all types of davits. Even so, a seaman should never attempt something he knows nothing about.

BOAT COVER.—When you remove the boat cover, do not discard it or the spreaders. To get the most use out of the cover in the lifeboat, #7 canvas should be used. The cover should not be painted. Use canvas preserver, which will leave the cover pliable.

STRONGBACK.—Unless you need the strongback as a skate on the high side, throw it overboard.

PAINTER.—Lead the painter well forward, outside of everything. Take up all the slack and make fast properly.

RUDDER.—It is advisable to ship the rudder before the boat is waterborne, but take care that lines are not fouled on it.

PLUG.—Be sure the plug is in.

OUTBOARD GRIPES.—The men are inclined to be afraid to release the outboard gripes. Since a lifebelt will hinder you, it is better not to wear it while you are outboard.

STATIONS.—When they see another boat already swung out, some of the men are liable to leave their stations.

QUADRANTAL DAVITS.—Be sure the pins are in the handles so that the handles will not come off when the men begin cranking outboard.

GRAVITY DAVITS.—With gravity davits one man is able to turn out and lower a lifeboat, simply by raising the lever slowly. As the boat rolls down the runway, it should be controlled by frapping lines.

RADIAL DAVITS.—Release the outboard gripes first, then the inboard gripes. Hoist the boat clear of the chocks. Be sure the falls are in the fairleads and belayed on the cleats. Lower the chocks on the deck.

If the boat is to go out bow first, be sure there is clearance aft. Have two men haul on the after guy as the fore guy is being slacked, and the men at the gunwale walk the boat aft. When the forward davit points directly aft, shove the boat forward and bear out. Slack the after guy and tighten the fore guy.

When the after davit points forward, have the men shove the quarter outboard. Haul on the after guy, square the boat, and make the guys fast.

HIGH SIDE.—Be sure the boat is secured so it will not go athwartship when the gripes are

slipped. After the gripes were released on two high-side boats of the *Vestris*—30 degree list—they slid across the deck and rolled overboard.

LOW SIDE.—Be sure you have frapping lines around the falls before you release the boat from the chocks. Otherwise, if the ship has much of a list, the boat will swing out with tremendous force and remain hanging beyond your reach.

Swing the davits out just enough for the boat to clear the ship's side. Do not let go of the handles of the davits until lashings are put on them. As an additional precaution, put wedges in the gears of the davits.

SWUNG OUT.—Remove the boat cover, make it up snugly, and place it in the boat's bottom.

Remove the outboard and inboard gripes.

Lead the sea painter, toggled at the thwart, from the inboard side of the boat well forward, outside of everything.

Do not put the plug in while the boat is hung.

Hoist the boat clear of the chocks until the falls are not quite two-blocked, and swing out. This will two-block the falls.

Fit a stout spar or a strongback to the davits temporarily, so that it may be shifted if necessary.

Chafing pads of good size are fitted to the strongback, so that they are between it and the

boat. Shift them to conform with the boat's shape.

Use a handy-billy to haul the boat to the strongback, meanwhile easing the falls gently until snug up.

Keep shifting the strongback and the chafing pads or ease the falls until the boat takes up a satisfactory position.

The boat should then be griped in and the handy-billy removed. The gripes should be fitted with a toggle, if they are not already fitted with pelican or slip hooks.

The slack on the gripes should be taken up from time to time. Thus swung out and griped, the boats require watch-to-watch inspection, especially during heavy weather.

HALF CHOCK.—A safer method of securing the boat ready for quick lowering is to have the boat resting on a half chock, the inboard side. Remove the outboard gripes and lower the outboard half of the chocks. When ready to swing out, trip the releasing gear on the chock and let go the inboard gripes.

5. Lowering

The main consideration in lowering is to make certain that at least one boat—which can hold the average merchant ship's entire crew—reaches the water safely. If you see that a shortage of adequately trained seamen is liable to result in swamped boats, take the most competent men from the other boat crews to lower away.

WAY.—It is dangerous for inexperienced seamen to launch a lifeboat when there is way on, though old-timers prefer to have the vessel going ahead. William Caves, for instance, likes to lower when the ship is traveling at about five knots—but Caves is a highly-skilled veteran.

In the last war, 339 men were lost on the torpedoed *Persia*. Because the ship was going ahead, the boats were swamped, torn away, or capsized. On the torpedoed *Maloja* 124 were lost; the ship had sternway. Because the torpedoed *California* had way on, a boat was overturned; 43 lost. The *Antony* was under way when the boats were lowered. The boats were swamped; 55 lost. The engines could not be

stopped aboard the *Abosso*. Thirteen lifeboats were swamped; 65 men lost. Way on the *Garmoye* caused one boat to capsize; 20 lost.

STORM OIL.—If the sea is rough, open the cocks on the storm oil tanks forward.

SKATES.—If the lifeboat is not equipped with skates, use the strongback and oars as skates, to get the boat over rims, ports, gangway fittings, and other projections, and past the promenade deck on the high side. In this manner *Vestris* seamen forced a boat down a 30 degree list, launching it successfully.

STERN FAST.—If the ship is pitching, you will need a stern fast as well as a painter, both hauled taut, to keep the boat from swaying.

ORDERS.—If other boats are being lowered, be sure you do not execute an order meant for another boat.

DECK CARGO.—When deck cargo has been washed over the lee side, and is alongside the ship so that it is impossible to launch a lifeboat safely, then a chance has to be taken to lower from the weather side—unless the ship has maneuverability and can be turned around.

FRAPPING LINE.—Frapping lines will keep the boat from swinging. Use one for each fall. On a cargo or tank vessel secure the frapping line to the moving block, or take a bight around the fall. If the line is equipped with a hook, secure

the hook on the swivel of the moving block. Handle the frapping lines from the boat deck, a man to each line.

PAYING OUT.—Pay out the fall from a sitting position. That will eliminate the chance of slipping on an ice-covered deck or being overbalanced by a rolling ship.

Wear gloves to avoid rope burns.

See that the falls are properly turned on the cleats.

Lower slowly at first, with sufficient turns so you can pay out smoothly. Avoid jerks, which can exert dangerous strains on the davits, falls, and boat.

Unless you are experienced, do not take your eyes off the bollard or cleat.

Be careful that the fall does not jump off the fairlead. It will let the boat down with a jolt.

The after end of the boat should be slightly lower than the forward end.

JACOB'S LADDER.—The Jacob's ladder should be put over the side amidship of the boat and not alongside a davit.

RELEASING GEAR.—Work the releasing gear about a foot or two above the water. If the releasing gear is operated after the boat is waterborne, it is liable to jam.

If the ship has slight way, by handling the rudder, you can steer the boat away from the

ship's side. This eliminates the danger of another boat being dropped on the waterborne one.

Operate the releasing gear when the ship has reached the limit of its downward roll.

Release the boat as a sea approaches, so that the boat will drop on the crest.

METAL LADDER.—A metal ladder over the side can punch holes in your lifeboat if the ship is rolling.

LIFELINE LANYARD.—Ensign Nathan Cohen suggested: "Have a small lanyard spliced to at least two lifelines and made fast to the davits, so that the last men on deck can swing the lines in."

FENDER.—Commander R. R. McNulty, U.S.N.R., advised: "As a fender when lowering boats, the old-style cork life jacket is useful. In addition to acting as a fender, it is a good thing to have a couple of old-style cork jackets hanging over the boat, as they act as skids in taking the boat over butt straps and port hinges."

6. Waterborne

Once your highly buoyant lifeboat is waterborne, no difficult process is required to keep it from capsizing. You merely must have the weight distributed properly. Allow no one to stand on a thwart. Five men can do all that is necessary to get the boat away from the ship's side. In a heavy sea maintain a low center of gravity by having the balance of the crew keep down on the bottom boards.

BLOCKS.—As soon as the releasing gear is operated, watch out for swinging blocks.

FALLS.—Falls may be used to slide down in abandoning ship.

BOAT HOOK.—Have a man shove off from the ship's side with a boat hook or oar.

PAINTER.—Have the bow man haul as much of the painter into the boat as possible before he cuts loose. This will give you extra line. Pulling up on the rope will put the boat in motion, enabling the man at the tiller to steer, providing the sea is not too rough.

OAR LASHINGS.—When letting go the lashings on the oars, be sure only half of them are

turned loose. Otherwise, if the boat capsizes, all the oars will be lost.

OARSMEN.—It is not necessary to man all of the oars. One oarsman on each side will be able to get the boat away from the ship quickly. They should row immediately at right angles to the ship, to eliminate the possibility of another boat being lowered on top of the waterborne one.

ROWING.—It is difficult to row in a heavy sea. The men can last at it about fifteen minutes, and by making every stroke count, can perhaps get a half mile from the ship.

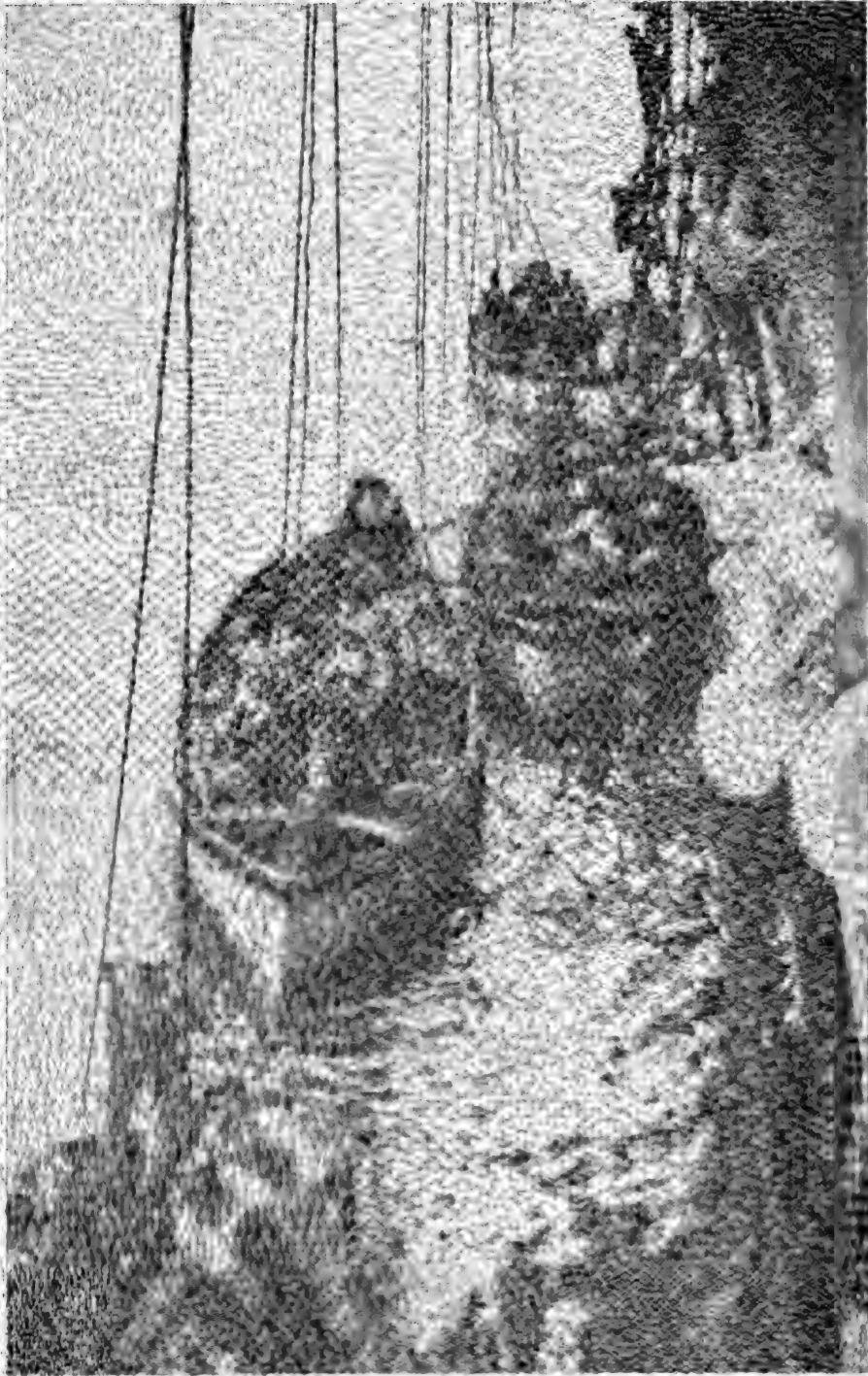
Be sure you do not start pulling on the oar before it is in the water.

Keep your eye on the stroke oar on each side of the boat.

Put the weight of your body on the oar. In a boat properly rowed a thrumming noise issues from the oars and gives a sense of timing.

In a double-banked boat be careful that you do not draw a longer stroke than the man in front of you. If you do, you are liable to dig him in the back with the handle of your oar.

FEATHERING.—While it is the customary practice to grasp the handle of the oar with both hands on the upper side, many oarsmen find it easier to feather with one hand on the upper side and one hand on the under side. This is the grip



The weather aided these Japs more than their seamanship. (Aima)

used by Negro seamen of the West Indies. They are exceptional oarsmen. The grip is also used by the Ellis and Gilbert Islanders, and no finer oarsmen live.

Do not feather until the blade is clear of the water. If you do so, the oar will be forced down by the way of the boat and it will likely foul the oar behind you.

At this time feathering is not important. Your chief concern should be to get clear of the ship's suction area.

LIFE PRESERVER.—If everything is behaving properly, and the men realize the importance of keeping the weight distributed evenly, there is no need to continue wearing your life preserver. Drop it to the bottom of the boat.

SEA ANCHOR.—Put out the sea anchor and rest up. Do not attempt to set sail immediately. Wait until shock, confusion, and panic have subsided. When the panicked crew of the torpedoed Norwegian freighter *Blink* tried to hoist a sail, the lifeboat capsized, throwing 23 men into icy water and immediately costing one man's life. Food, water, oars, and sail were lost.

MAN OVERBOARD.—Be sure no one is near a churning propeller. Herbert L. Gardner, Jr., wiper from an Atlantic Refining Co. tanker, saw two shipmates caught in the propeller's suction and dragged into the blades to their death.

Men have died by being struck by rescue boats. Approach a man in the water no closer than the distance needed to reach him with an outstretched oar.

PISTOL.—Be sure that no hot-headed shipmate has a gun. Firing it at the sub will only draw fire on your boat. Besides, it is unlawful for merchant seamen to possess firearms.

PANIC.—Away from the ship in a lifeboat that is riding nicely, you have little or no cause for panic. When the *Robin Moor* men heard machine-gun fire, they were stricken with terror that they would be shot. But the sub's gunners were merely indulging in target practice, firing at wreckage.

If the enemy intended to machine-gun a crew, they generally would not let the crew get off the ship.

The sub commander who sank the *Robin Moor* provided extra rations for the crew and first-aid materials for Chief Officer Mundy. P. H. Janssen, fireman from a torpedoed American freighter, after being hauled aboard a submarine by the German crew, spent five minutes on its deck before he was transferred to a lifeboat.

More likely than not, you will find that enemy sailors will give you the same treatment they would expect to receive.

BULLET HOLE.—Do not give up because a

hole is shot in your boat. The airtanks will float her, and with proper tools any boat can be patched at sea.

In a sheet-metal boat, if you have sheet-metal screws, a prick punch and a screwdriver, by cutting up an airtank you can patch in an hour a hole one foot in diameter.

F. J. Mills, chief engineer, patched a damaged lifeboat with a piece of canvas. His shipmates held him under water, while he tacked the canvas in place, coming up at intervals for air.

STRAIN ON PAINTER.—Do not unhook the forward fall until a strain is on the painter. If the releasing gear is operated before the painter is taut, the boat may come up with a violent jerk.

LIFELINE.—Never use a lifeline as a painter. A turn taken with a lifeline around a thwart capsized a lifeboat, drowning several men.

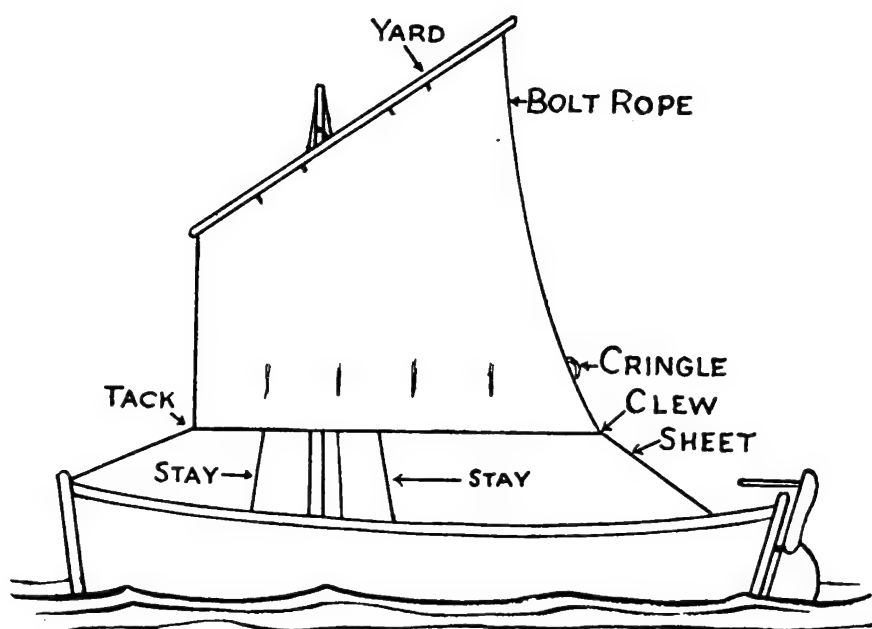
BURNING OIL.—Many lifeboats have been rowed through oil flames, so do not jump overboard if your boat is surrounded by fire. Row against the wind to avoid gases as well as fire.

In carrying out rowing orders remember that you are facing the stern. Port will be on your right, starboard on your left.

OVERTURNED LIFEBOAT.—A capsized lifeboat can be righted by the combined weight of four or five men on one side.

7. Setting Sail

Ship's discipline must not be relaxed in the lifeboat. There is much work that has to be done; and the sooner the men are apportioned their duties, the better it will be for their morale.



Dipping lug sail.

SETTING SAIL.—Before you step the mast, reeve the halyard through the sheave. Step the mast and tighten up on the stays. Bend the halyard about one-third way up on the yard-arm, starting from the fore leech. The fore leech is

easily recognizable because it is shorter than the after leech, or after end, of the sail.

No downhaul is required. Bend the tack to the stem or cross bows, depending on whether the wind is abeam or on the quarter, for your proposed track. Hoist the sail. Then tighten up on the halyard. Secure it at the foot of the mast, or use it as a stay. Haul in the sheet until the sail fills.

SETTING WATCHES.—Set the watches the same as aboard ship, one man in charge of a watch, the best men for the late parts of the night. Once a man learns what to do, he is expected to show initiative. He should know enough to change course when the wind changes, and to inform the mate of it when the latter wakes up.

RATIONING FOOD.—Put a responsible person in charge of the rations.

If you have potatoes and onions in the extra rations, keep them dry or they will sprout. If they take up too much space, remove them from the sacks and drop them along the side benches on top of the tanks.

On dry days inspect the food to see if anything is spoiled and to find out what is on hand.

If rations are short, the men must conserve their energy, moving about only enough to keep the kinks out of their knees. And watch out for

the kinks—in case you have to move fast in a squall.

RATIONING WATER.—Be sure you know, before the emergency arises, the amount of fresh water in your lifeboat. The seven men in a boat from the torpedoed British freighter *Anglo-Saxon* found only four gallons in their breaker. Five of those men never reached land.

Use this simple method to determine how long your supply will last:

Your water breaker contains, we will say, 15 gallons—128 ounces to the gallon—or 1920 ounces. Dividing by 6 ounces—the average ration—you learn that the breaker contains 320 cups of water. Subtract 20 cups, because the breaker is not entirely full—to allow for expansion during the winter months—and you have 300 cups of 6 ounces.

This amount will provide water 3 times a day for 100 days.

$(100 \div \text{Number in boat})$ equals number of days the water will last.

RAIN WATER.—For rain water use an airtank from the stern—never one of the forward or waist tanks. Because in heavy weather the boat will ship water frequently in these sections, there is a greater need of the airtanks to maintain buoyancy.

In collecting water, you will find that it takes a lot of rain to get the salt out of the sail. Therefore, you should have an extra piece of canvas to be used only for catching water, or better still, a piece of oiled silk or even oilcloth.

You are advised against using the boat cover to collect water. Not only is it soaked with salt, but if the boat cover has been treated with canvas preserver, the water will become foul in warm weather.

Stop for water during heavy squalls. If the squalls are frequent, you need stop only long enough to make up for what has been drunk during the day.

Care must be used in storing an airtank full of water, so as not to upset the boat's stability, or put an undue stress on the bottom.

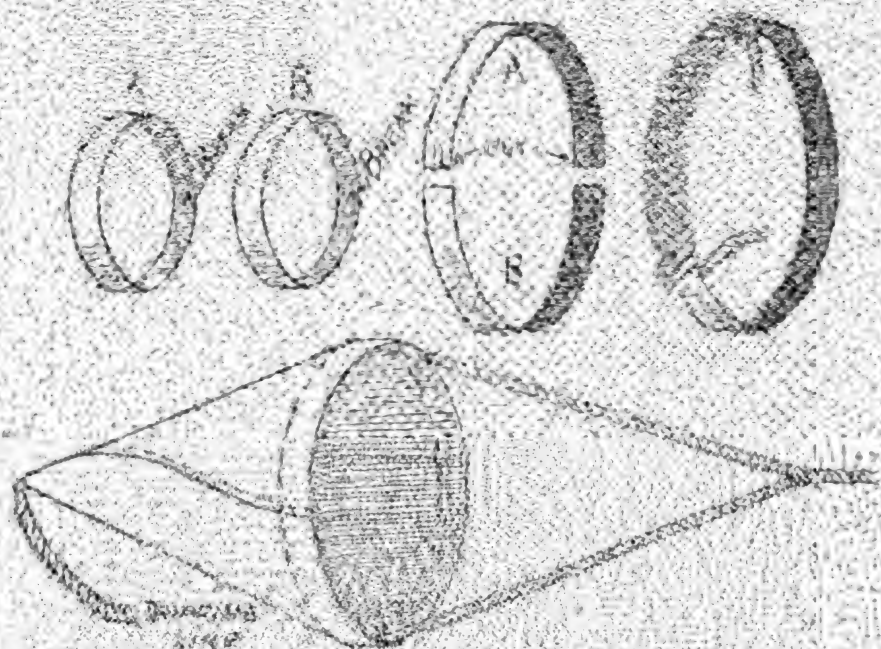
COMPASS.—Use the staples from the lifelines to secure the compass aft for the man at the tiller. Lubber's line should line up with the center of the keel.

If the alcohol is missing from the compass, fresh water may be substituted, though it will corrode the metal. As a last resort in freezing weather, fill your compass with water, wrap it well, or bank it with snow, and keep the compass light burning.

FLARES.—When you have occasion to use one,

lash a flare to the end of an oar, so the men will not be blinded by its glare. Be sure to keep it away from the sail.

SEA ANCHOR.—To make a sea anchor: With a hatchet cut two metal rings, about one inch wide, from the rank used for rain water. Cut



A and B represent two rings cut from the rank used for rain water, which are made into the grommet for the sea anchor, as described in the text.

the rings to break the circle, and pull each one out to form a half-circle. Split one end of each half-circle by making two cuts, and fit them together so as to make one large ring or grommet. Hammer the joints tight and secure with marlin. Serve the grommet with rope yarn or marlin, so it will not cut through the canvas.

Set the canvas up in a conical shape and sew the ring to it. Add bridles and line. You will have a sea anchor that is similar to those ordinarily found in lifeboats.

In case no canvas is available for a sea anchor, secure a bucket or a can in the center of an oar. Secure a line to each end of the oar and make the lines fast, one to each side of the boat, well forward. (*Also see page 76 for Dixon's sea anchor.*)

OARS.—Lash all the oars, not otherwise in use, on the weather side. This will raise the lee side, and will help to prevent swamping.

STEERING OAR.—If you use the steering oar, fasten a short lanyard on it near the leather—the part of the oar which rests in the oar lock. That will eliminate the chance of losing it. The lanyard also allows you to walk away from the oar. In rough weather kneel with the steering oar; do not stand.

RAIL.—To build a rail, lash an oar to the mast, and fit one end in the crotch of a boat hook which has been secured upright. Cut the staff of the boat hook to make a stanchion of sufficient height. Use adequate lashings. The rail will aid the men going forward or aft. By standing on a thwart, supported by others and resting against the rail, the mate will be better able to take a sight.

MAST.—Many times in stepping a mast, the

tenon on the heel of the mast proves to be too small for the mortise of the step, in which case you will have to wedge the tenon to fit tightly.

SPREADERS.—You can use the spreaders to make tillers, or you can cut them up for use as wedges.

BOAT COVER.—The boat cover will shelter you from the sun and rain. A piece of it can be used to increase the sail area. Use other pieces to keep dry the sextant and chronometer, which may be stowed aft in the space of the airtank that you are using for rain water. The cover lashings, as well as the grab lines, will supply extra line for replacements and additions to stays and halyards.

SAIL BAG.—By slitting the sail bag at the seams, you will have extra canvas for increasing the sail area.

THWARTS.—Round off the edges of the thwarts, so they will not cut your legs.

LEAD POISONING.—A tank used for drinking water must not be painted on the inside with red lead or any paint containing lead. Even a small amount of lead in the water you drink will poison you.

FUEL OIL.—To remove fuel oil from your skin, use castor, mineral or Diesel oil, lard or any light oil, then finish the job with soap and water.

8. Open Boat Seaman-ship

The important fact to remember about sailing is that the average double-end lifeboat, in good condition, is exceptionally seaworthy. It is far better equipped to fight a storm than you are. In any kind of a gale, do not try to sail the lifeboat. You will only be offering resistance against a greater force, thus inviting disaster without getting anywhere. But if the men keep down on the bottom boards, creating a low center of gravity, the boat will be able to take a terrific pounding without capsizing.

REEF.—In hoisting sail in a stiff breeze, always reef your sail first. If it is not needed, the reef can easily be shaken out.

TILLER.—When you move the tiller to port, the boat turns to starboard, and vice versa.

In good weather handling the tiller is child's play. It is then that you should pick up pointers and gain confidence in steering.

SAILING.—To get the best results in speed,

the sail should be kept as nearly as possible at right angles.

A boat rigged with a dipping lug sail cannot point higher than 8 points to the wind—which means a beam wind—and make any speed. To reduce somewhat the considerable amount of leeway—the sideways drift caused by the pressure of the wind—which a beam wind causes, shift as much weight as you can to the weather side. See page 129 for changing a lug to a sprit-sail.

FOLLOWING SEA.—You should learn to steer in a following sea during the daytime.

Keep a following sea on your quarter.

Caution: When a following sea starts to break on you, do not pull the tiller away from the sea. If you do, you will bring the boat broadside toward the oncoming sea—with the danger of being swamped.

In a following sea always put the tiller toward the breaking sea. Hold it there while the sea is rushing upon you, bringing the tiller amidship when the sea has passed. You must repeat this maneuver again and again—every time the sea is about to break.

At night, when the water is phosphorescent, it is easy to determine which way the sea is breaking.

It is much easier to steer at night as well as by

day if a white pennant is hoisted on a boat hook just forward of the helmsman to show the direction of the wind.

COMPASS.—It is not necessary to watch the compass. It gives you only the general direction. *Watch the sail.* If you are making good speed, do not worry about keeping a course.

SQUALLS.—In squally weather you will be able to make excellent speed; but the boat will be very lively, and much care will be required in handling it and the sail. In heavy squalls shorten sail by reefing and be alert for a sudden shift of wind—or the sail may be caught aback, that is, reversed.

WIND.—When running before the wind, it is always best to have the wind on your quarter in preference to astern. With the wind on your quarter, you will get the most speed out of the boat.

If the wind veers, it is going clockwise. To keep the veering wind on the quarter, put the helm up to it.

If a sharp puff of wind hits the boat, ease the helm.

SEA ANCHOR.—Used as a drag, the sea anchor will keep the boat in line with the wind and the sea.

Great care must be taken in using the sea anchor as a drag. Watch out that the line does not

unlay, kink up, and break apart, all of which can happen within a very few minutes.

When riding out a gale, the sea anchor should be over the bow. .

When their sea anchor was lost, the *Robin Moor* men used the oars to keep the boat head on. The boat took such a pounding that the men let it go broadside to. With the weight low, the boat rode nicely. In a very rough sea, you must not attempt this. With water towering around the boat, there will be too much risk of it filling up and swamping. In a very rough sea, keep the boat head on. If the sea anchor has been lost, use the oars.

LEE SIDE.—Since the men are used to walking on the lee side aboard ship, they must be cautioned *not* to walk on the lee side of the lifeboat. Their weight on the lee side is liable to capsize the boat. The men must keep on the weather side, and as close aft as possible, to hold the rudder down in the water.

SHEET.—Do not make the sheet fast. If an incompetent man is on watch, and a heavy blow comes up, there is grave danger of the boat capsizing. You may take a turn around a cleat, but be sure that you can let go the sheet instantly.

Never haul the sheet so tight that the foot of the sail is inside the gunwale.

COLLISION.—When the boats are together,

the men are apt to become a bit playful, especially at night if the mates are asleep. Care must be taken that the men do not run the boats too close and have a collision.

STORM OIL.—To help prevent seas from breaking, use storm oil. All lifeboats are provided by law with storm oil. A conical-shaped can is inserted in the sea anchor. By cracking the tap sufficient oil will flow to make a slick.

LAGOON GLARE.—Near lagoon islands in the South Pacific, a lagoon glare will be visible on clear days. This is a light greenish tint in the sky caused by the reflection of the sun from the coral on the bottom of the lagoon. It is often very pronounced, and is sometimes visible up to 75 miles. With only a compass Baker, the *Prusa's* third mate, has navigated a small boat between the islands in the Gilberts by this glare.

CLOUDS.—A cumulus cloud over water, when the sky is relatively clear, usually indicates an island. If only one cloud is in the sky, and it is cumulus—which has the appearance of heaped, rounded masses—an island is practically assured.

COAST GUARD SIGNALS.—

“Do not attempt to land in your own boats.”

Day: Red flag, white flag, waved together.

Night: Red lantern, white lantern, waved together.

“This is the best place to land.”

Day: A man beckoning on the beach.

Night: Two torches burning together on the beach.

LANDING.—Near land is where impatience too often has cost lives. If the breakers are heavy, wait outside, if possible, until they moderate.

Do not leave your lifeboat and attempt to swim through surf in a rough sea, unless it is your only choice.

As you approach the beach in the boat, look for the spot where the breakers are the least heavy. Head straight for the beach. The sea anchor must be over the stern. The oarsmen must keep a strain on the drag line. That strain will prevent the sea from throwing the stern around and capsizing the boat. Use oil to help keep the seas from breaking.

Coming to the beach, as the boat reaches the crest of the last sea, the oarsmen should pull strenuously. The farther you can get the boat up on the beach, the less chance there will be of capsizing.

Your greatest danger is when the bow becomes buried in a sea. This is one reason why you must never remove the air tanks.

A good method of rowing through surf is to have half of the crew sit in the opposite direc-

tion to the others. When a heavy sea roars down, have one-half of the crew row toward the sea until the crest passes. Then have the other half row toward the shore until the next sea comes along. Remember that in surf landings the seas are irregular and their velocities varied.

When the gunboat *Tacoma* went aground on Blanquilla Reef near Vera Cruz in 1924, William Caves used this method in taking a line to the reef for a breeches buoy. With six men, three sitting each way, Caves was able to get a 13-foot dinghy through heavy surf.

DUCKS.—If you see ducks, you are near land. Ducks do not fly out to sea. They fly from point to point.

HELIOGRAPH.—If your signaling mirrors are lost, you can still make use of the sun to attract attention. On the 19th day adrift, 18 survivors of an American freighter saw a ship on the horizon. Fearing the ship would go on, they rigged a flattened tin can, hoisted it on an oar, and flashed it in the sun as a heliograph, thus attracting the steamer which rescued them.

9. Navigating

If your lifeboat is without a navigator, these directions are for you. There is nothing difficult about them. They are as simple as the directions for a child's game. But they will provide you with the key to your own rescue.

Before leaving your home port, purchase a U. S. Hydrographic Office "Pilot Chart" covering the area of your ship's route. Pilot Charts cost ten cents a sheet, and are obtainable at any nautical store. If you are a soldier or sailor, and consequently do not know your route or destination, we suggest that you buy for sixty cents the six sections taking in the entire world.

Disregard the printed statement that the chart is not to be used for navigation. For your purposes it is entirely adequate. During his nineteen days in the *Robin Moor* lifeboat, Banigan daily plotted his position on a Pilot Chart.

If you have no chart, and do not know of any islands North or South of you, set your course as close to due East or due West as the winds will permit, and eventually you will sight land.

With a Pilot Chart and knowledge of your approximate position, you can plot the track or route you should take, simply by observing the nearest point of land from you.

Whether the average winds are in your favor can be readily seen by the wind roses on the chart along your chosen track. The chart provides adequate instructions regarding the wind roses.

If you are an untrained man, do not concern yourself with the set of the current. Your guess as to allowance will undoubtedly be out of proportion.

Obtain your true course—the one you intend to steer by—in this simple manner:

Note the compass rose—the circle on the chart that is graduated from 0 to 360 degrees.

Take two sticks or pieces of cardboard.

Lay one on the proposed track.

Lay the second stick across the center of the compass rose parallel to the first stick. Use the stick in the same way you would use a ruler.

Read off the course indicated by the stick on the compass rose *in the direction of the proposed track*.

Note the lines of variation plainly indicated as to the amount and direction, East or West.

Variation is the difference between the true or geographical North and the magnetic North.

NOTE ON CHART (*see opposite page*)

On the opposite page is reproduced the photograph of a section of the Pilot Chart on which John J. Banigan plotted the noon positions of his *Robin Moor* lifeboat. The oblique line shows the *Robin Moor's* course and noon positions east of the Great Circle track, from May 19th, 1941, until the vessel was torpedoed and sunk by a Nazi U-boat on the morning of May 21st, 0805 Greenwich time. The jagged line, running from right to left, shows the route of Banigan's lifeboat, from setting sail on May 22nd to 10:00 the night of June 8th, when the eleven men were picked up by the Lloyd Brasileiro liner *Osorio*, Lat. $0^{\circ}46' N$, Long. $37^{\circ}37' W$. Note that the boat was about 119 miles from St. Paul Rocks on May 27th, when it reached the southernmost limit of the NE trades. Note the two periods of doldrums—calms—from May 29th to June 1st and from June 4th to June 6th. Note that no positions were plotted for May 31st and June 3rd when overcast skies prevented the taking of sights. These positions were checked back in Banigan's Work Book by Captain W. L. Pereira of the *Osorio*. Navigators attempting to take sights in lifeboats have complained that they were unable to find the horizon. These checked positions offer documentary evidence that by standing on a thwart, supported by crewmen and resting against a makeshift rail, a mate should experience no great difficulty in making use of his sextant.



(Photograph by Edward V. Benning)

But don't worry your head about what variation is. Concern yourself merely with what you have to do about it.

Variation represents an error which you must correct.

If it is stated on the Pilot Chart that the variation is *West*—*add* the amount of variation to the course indicated by the stick on the compass rose. If the variation is *East*—*subtract*.

The answer is the course to steer.

So long as the sail is kept full, a lifeboat rigged with a dipping lug sail will average between 3 to 4 knots in a moderate breeze. Gauging your speed by this, and mindful of the chart's scale of measurements, you can plot your position day by day.

The scale of latitude is used for measuring distances.

You will find this scale on the right- and left-hand sides of the chart. One degree equals 60 miles or minutes. The scale is graduated in 6 parts of 10 minutes each.

Always measure off distances near your parallel of latitude.

The scale of longitude is graduated in the same way as the scale of latitude. But never use the scale of longitude to measure your distance.

When there is any shift in the wind which may require a change in course, you should make

each change, if possible, in the general direction of your proposed track.

We have made no attempt to teach the elements of navigation, but we have presented a working plan which will help you to reach land or the steamer tracks where you have a chance of being picked up.

10. Transports

In transporting troops the government works on a wide margin of safety. Measures of precaution are heaped upon one another. During the last war four or five of the larger troopships would be escorted by six or eight destroyers, equal to three times as much protection per ship as was given mercantile convoys.

More than 2,000,000 American soldiers were transported to France without a casualty on the eastbound trip. By June and July of 1918 about 300,000 U. S. troops a month were crossing the Atlantic.

This success was due in part to the fact that the Germans were concentrating on merchant shipping and homebound empties, and made only a few feeble attempts against our troopships. They did sink the U. S. transport *President Lincoln*, but she was a westbound empty, and only 26 persons were lost.

Despite all the measures of safety, U. S. troops were killed on transports. The British *Tuscania* was torpedoed in February, 1918, and 213 American soldiers died. The *Otranto* was sunk

by collision, and 431 U. S. troops were killed.

The point to remember is that when transports are hit, the loss of life is terrific: *Arcadian*, 279; *Aragon*, 610; *Louvain*, 224; *Santa Anna*, 638; *Leasowe Castle*, 101; *Galway Castle*, 189. These figures should induce a soldier at sea to be at all times vigilant and alert.

He should acquaint himself with every rule and regulation regarding his own safety. He must realize that the restrictions in area and other regulations, absolutely unavoidable in handling the mass, become an added hazard to the individual's safety. He must understand that in abandoning ship his superior officers are governed by orders and regulations, and are not fortified by experience. When a torpedo hits, the government's wide margin for mass protection becomes a narrow margin for individual error.

APPROXIMATE POSITION.—You are to be given the approximate position of the transport at the time of abandoning ship. Without this approximate position you will not be able to set a course for the nearest point of land.

A transport's abandon-ship facilities are based on the probability that the survivors will be picked up within a short while. Since weather or other conditions may prevent your immediate rescue, you should make individual preparations for your safety. Among these individual precau-

tionary measures should be the purchase at any nautical store of six 10¢ Pilot Charts, covering the entire world.

SILENCE.—After the order is given to abandon ship, keep quiet. No one is to talk except those who are giving the orders or supervising the execution of them.

OFFICERS.—Non-commissioned officers are not to leave the transport until all their men have left. Commissioned officers must be the last to leave the ship.

ORDERS.—Do not obey any orders except those given by the officers. Follow these orders out as you were instructed during the drills. Be sure that you do not misinterpret an order. Do not forget that you alone—by not knowing what to do—may be the cause of a panic.

QUARTERS.—Since you will be assigned to a certain section of the ship for the duration of the trip, you must acquaint yourself with the alleyways, companionways, and other means of escape in your area. Be sure you know your alternative if any of these exits are cut off. Use only the alleyways and exits assigned to your unit.

During your recreation period study the details of the ship's construction. Find the places which will afford protection during shellfire or bombing. Be sure you know the most direct route to your raft or boat station.

UNDERCLOTHING.—Said John J. Smith, pumpman from a torpedoed tanker: "From now on, winter or summer, the tropics or the arctic, I'm wearing heavy woolen underwear."

Despite the discomfort, wear heavy underclothing the entire voyage.

RATIONS.—Though your boat or raft will be supplied with rations, it is advisable to take along extra rations. Concentrated food can be carried in a large-sized money belt.

LIFE PRESERVERS.—If your preserver is a cork jacket, obtain a piece of nine thread or stout cord to tie around it. This will keep the preserver snug and low. It will lessen your difficulty in going down a lifeline, and your head will not be forced under water, which is one of the tricks of these treacherous, high-riding jackets.

LIFEBOATS.—Every other boat should be lowered on each side, to reduce the possibility of one boat being dropped on another.

LIFERAFTS.—The rafts should be released one after the other on both sides, beginning from the after end of the ship. This will prevent the rafts bunching up and will allow the men more freedom of movement over a larger area.

LIFELINES.—Do not jump overboard. Your cork jacket will knock you out and cripple you. It may cost your life. Use a line, net, or ladder.

LIST.—The torpedoed transport *Transylvania*

was sunk in May, 1917, with a loss of 269. A slight list was corrected by massing the troops on the high side, an example of the practical use of moveable weight. Had the men gone over the low side, greater losses would have been incurred.

SHELLFIRE.—Should the enemy, by shellfire or bombs, destroy the boat or raft to which you have been assigned, do not attempt to crowd into another boat or raft. Depend on your lifebelt for the time being.

EXHAUSTION.—Cold and exposure will hasten exhaustion. An exhausted man should be transferred to a lifeboat.

SHOCK.—Have an understanding with the men in your unit to watch one another for signs of shock, which often works by delayed action. Many men have perished in the water who could have been saved with a little assistance during a seizure or relapse. (*Also see page 94.*)

11. Liferrafts

Liferrafts are so varied in design and capacity that you must find out for yourself the limitations of the raft to which you may have to entrust your life.

PONTOON RAFTS.—The lattice boards on the pontoon rafts are nailed down. When the rafts hit the water, the impact splinters them, and the nails often protrude. Nailed boards even pull apart from the seas hitting them. The boards should be bolted. If this is not done, then a pontoon raft should be eased to the water with a line.

TANKERS.—Tanker rafts should be launched near enough to waterborne lifeboats so that a line can be passed from the boat to the raft. If this is not possible, the raft is to be considered a death trap, and is to be used only as a last resort, or when there is no oil slick.

SCREWS.—The suction area of a revolving screw is thirty feet or more, depending on the r.p.m. Therefore, rafts secured aft must be launched outside of this area. Be sure that the wind and the sea will not cause the raft to drift into the suction area.

RATIONS.—Do not depend on the liferaft being equipped with adequate rations, or on the man detailed to bring along a watertight package of food. Any food in your abandon-ship package that lacks a waterproof covering is certain to be spoiled. It is advisable to equip yourself with a water-repelling money belt to hold concentrated food in airtight containers. A canteen filled with water and strapped to your waist will not hamper you.

PROPULSION.—The prime purpose of a raft is to get you out of the suction area of a sinking ship and to keep you afloat until you can be picked up. Yet Gene Aldrich, Harold Dixon, and Anthony J. Pastula, Navy fliers, spent 34 days in a rubber liferaft, whose inside dimensions were 28 x 80 inches, and traveled 1000 miles, chiefly by drifting. But by cutting the uppers from a pair of shoes with thick rubber soles, they made usable paddles.

OARLOCKS.—The men on a liferaft from an Atlantic Refining Co. tanker took turns serving as human oarlocks. Their bodies were badly bruised and their hands severely burned. These injuries could have been avoided by crossing the bights of the grab lines and putting the oars through the loops. They also could have used their leather belts.

WEIGHT.—Be sure the weight is distributed

properly on your liferaft. If you are on a decked-over liferaft, do not sit up in a heavy sea or you will be washed overboard. Lie down and grip the lattice-work deck.

TRIP RELEASE.—Paul Voss, A. B. from the torpedoed *Collamer*, reported: "Had liferafts been secured with a trip system other than a pelican hook, the man who releases the raft would not be in danger of being hit by the wire pennant holding the raft in place."

DOUBLE TRIP RELEASE.—The seamen on the *Patrick J. Hurley* suggested: "A double trip release should be provided for each of the liferafts, one operated from the bridge and the other from the liferaft."

KNIFE.—The *Gulftrade* seamen advised that a knife should be attached to each raft.

BLANKETS.—Be sure your raft is supplied with sufficient blankets.

LUBRICANT.—V. B. Hair of the *Cardonia* advised: "Fuel oil should not be put on the runways of liferafts. This dries and is more like glue than a lubricant."

WIRE ROPE.—It is advisable not to lash the rafts with wire rope. On the *Cardonia* a fire ax had to be used to cut the lashings on a raft.

LIFEBOAT.—If there is room in a lifeboat, once you are away from the ship, do not remain on the raft. Four men on a raft from a Norwe-

gian freighter were washed overboard and drowned, though the crewmen in a nearby lifeboat could have transferred them to their boat.

DESTROYER.—If you are on a destroyer, you must get your raft out of the explosion area of depth charges when the destroyer goes under. About 30 men from the *Reuben James* were killed when their rafts, 75 feet from the sunken destroyer, were blown out of the water by depth bombs. Do not be lax because some one tells you that the safety catches on the charges have been locked.

When the *Jacob Jones* went down, she exploded with such lethal force that the nearby rafts were blown out of the water, and a number of the men clinging to them were fatally injured.

LEE SIDE.—Make every effort to maneuver your raft to the lee of the vessel, so the raft will drift away from the sinking ship. Joseph Paul Tidwell, from the *Jacob Jones*, reported that the sea kept driving his three-man raft back toward the destroyer.

SEA ANCHOR.—Harold F. Dixon, the Aviation Chief Machinist's Mate who spent 34 days in a rubber liferaft, said he rigged a sea anchor out of his pneumatic life jacket, bridled to a length of the half-inch Manila grab line and

weighted down with the raft's gas-inductor manifold.

Lash the regular sea anchor on the side of the raft so that the lashing will break and the riding line will pay out when the raft is tripped. The sea anchor then will be of immediate use as a drag.

PAINTERS.—If you secure the liferaft painters to the ship, use breakable lashings. Never make them fast with turns around bitts or cleats.

HEADWAY.—If possible, wait until the ship has lost considerable headway before releasing a raft. Otherwise, the raft may be too far away when you abandon ship.

GUN CREW.—At least one raft must be left for the gun crew.

ROPE LASHINGS.—“Rope lashings secured to the raft were used on the *Gulftrade*,” James Johnson, second assistant, reported. “If the rafts had not been equipped with these lashings, the occupants would have been washed into the sea.”

RIDING A RAFT.—Never ride a raft down the skids. Usually it will turn over when it hits the water.

RAIN WATER.—If you have no other means of catching rain water, cut strips from your underwear and use them to soak up water.



After abandoning the tanker *Esso Balmor*, the crew reboarded her the next day. She was then towed into Guantanamo Bay. (*International News Photos*)

12. Tankers

William Caves, the bosun of the torpedoed tanker *Harry F. Sinclair, Jr.*, said that flames from the gasoline spreading over the water were 75 feet high. In view of such a frightening picture, it is difficult to warn you against panic.

Yet the records of torpedoed tankers bear out that, barring a direct hit, panic is your greatest danger. Captains have been forced to report that their men were lost because they would not obey orders. When flames are shooting skyward and the sea is afire, stake your life on a veteran's judgment. Men who have yielded to blind, hysterical impulses have seldom come out alive.

Said Alfred Carini, chief mate of the torpedoed *Pan-Massachusetts*: "I lost everything but my head, and because I kept my head, I did not lose my life."

LIFEBOATS INBOARD.—William Caves advises against having tanker lifeboats already swung out. If the men get to a boat before an officer or bosun, they are liable to launch it into flames.

LIFEBOAT CAPACITY.—It is difficult to ma-

never a lifeboat in oil slick, and particularly so if it is loaded to capacity. If possible, a tanker lifeboat should not carry more than half its complement. Fifteen persons, for instance, would be an ample load for a 28-foot boat.

LOWERING.—Because there is a grave chance that some of the men are not going to reach their stations, every tankerman must know every boat job.

Be sure enough men are in the boat to handle it when it hits the water. Four are sufficient. The radio operator was alone in the *Harry F. Sinclair's* #2 boat. When it became waterborne, he could not prevent it from drifting into the flames. His charred body was recovered.

LIFELINES.—The lifelines should be lowered before the falls are paid out. Lifelines coiled in a *City of New York* boat fouled on the men in the boat, and four of them were yanked over the side. They lost their lives.

LADDER.—Ladders are constructed to reach the water when the tanker is light. On a loaded tanker the end of the ladder reaches into the water, dragging astern. The ladder should be secured on deck so that this is avoided.

PAINTER.—If you cannot fireproof the painter, use 30 feet of wire, with a Manila tail leading into the boat.

STEERING OAR.—Because of oil slick, a steering oar is preferable to a rudder in getting away from the ship.

OARLOCK.—A Navy-style steering oarlock should be used. The ordinary type is of little service for a tanker. The steering oar has to be lashed to it, and the lashing is liable to burn.

OVERBOARD DISCHARGE.—If the torpedo has hit within the vicinity of the overboard discharge, any boat launched near the overboard discharge will be in danger of being swamped.

LIFERAFTS.—Because you have no control over them, rafts are useless for tankers, except under the most favorable conditions, and are to be considered as death traps.

RAFT RELEASING GEAR.—As long as the rafts are put on board, they should be given as much utility value as possible. Because a hot deck may prevent you from getting to the raft, you should secure a line to the releasing gear so that the raft may be released from a distance.

RAFT SKIDS.—A steel skid should be built between the mainmast and the break of the poop, at about #8 tank. The ladder should be lowered from the fore part of the poop. The waterborne raft will not collide with the lifeboat, but it will be close enough so that a line can be passed to it from the lifeboat.

Another steel skid should be erected between #2 and #3 tanks. The raft will float back abreast of the bridge, where a ladder should be lowered.

OIL SLICK.—In the thick coating of oil around the torpedoed *W. E. Hutton*, John J. Smith and his crew found it difficult to maneuver their lifeboat. Certainly then, a man who plunges into oil slick, hindered by a cork jacket, will encounter much greater difficulty in getting clear.

Captain E. V. Peters jumped for a lifeboat as a sea swung the boat away from the hull. He fell into water that was thickly covered with fuel oil.

Christian A. Hansen, the first mate, reported: "Captain Peters was a good swimmer, but you can't swim in that. It paralyzes you. We heard him holler, 'Here I am,' and we yelled, 'We're coming,' but by the time we could row back toward the ship there was no sign of the captain."

L. Leslie Pilbean, a British ship's baker, and a veteran of six torpedoings, used a successful method of swimming in oil slick. When his ship, the *Ulysses*, was torpedoed, he had to swim in oil slick for two and a half hours. Some of his shipmates were lost, because they tried to swim

on the surface, which is like attempting to swim through thick mud.

Pilbean survived because he swam under water, came up for air, and went under again, repeating this process until he was rescued.

CORK PRESERVERS.—No man from the *Harry F. Sinclair* who hit the water with a cork jacket got away. Richard Haigland, the chief mate, was knocked out by his cork life preserver. His charred body was recovered.

Even in going down a rope you will find a cork jacket treacherous.

WIND.—When your boat is waterborne, watch out that the wind does not change. Get to windward of the oil slick or flames as soon as possible.

WET TOWELS.—Captain Robert E. Christy, master of the torpedoed *Pan-Massachusetts*, got safely through the fire that framed his cabin by wrapping heavy wet towels around his head, face, and hands.

MOORING LINE.—Twenty men perished in the flaming sea surrounding the *Pan-Massachusetts*, but Captain Christy with three others were among the survivors. They made fast a mooring line on the fo'c'sle head, lowered the line over the side, waited until the bow was clear of flames, and slid down the line into the water.

TORPEDO FUMES.—The fumes from the torpedo made all of the *E. W. Hutton* men so ill that they vomited. A wet handkerchief, to which has been added a few drops of aromatic spirits of ammonia, tied over your nose and mouth will help prevent this distress.

SWIMMING.—Anderson, an oiler from the *Harry F. Sinclair*, swam under water. From time to time he looked up and saw the flames. He stayed under until he was out of the flame area. Few men could have accomplished this.

A messboy from the same tanker came up, fought the flames back, took a breath, and swam under water again. He was severely burned. A woman's bathing cap, fitting over the ears and fastening under the chin, would have greatly reduced his burns.

Both men agreed that with cork jackets they would not have got through.

Other seamen have dived into flames and managed to swim under water to safety. It is extremely hazardous and is strongly advised against. If a seaman must swim, he should do so to windward.

JUMPING.—If you must jump—as a last resort—wait for a clear spot, gauge the distance, and be sure you are facing to windward.

SHEAF KNIFE.—As soon as the vessel is at sea, sheaf knives should be distributed to tankermen.

Oily hands prevented the *E. W. Hutton* men from opening jackknives.

PUMPMAN.—Every Saturday morning, John J. Smith, the *E. W. Hutton's* pumpman, made it a part of his routine to oil and grease the davits.

BOAT COVER.—When a loaded tanker is hit, the blast usually sends a geyser of oil more than 100 feet high. Therefore, keep the cover on, even with the lifeboat swung out. Six inches of oil have been found in uncovered lifeboats of torpedoed tankers.

LAUNCHING LIFEBOATS.—Lower boats forward of the damage on the torpedoed side while the tanker is going ahead two or three knots. Then the oil will be flowing aft; but with no way on the ship, the oil will spread in all directions. Because of the oil, a boat abaft the damage will be difficult to launch successfully.

LIFEBOAT FALLS.—Do not go down a fall, which may be covered with oil. It may be impossible to check your descent to avoid injury. Use a knotted lifeline or the net.

LIFE SUIT.—A life suit should be considered an indispensable part of a tankerman's equipment. Each man should either wear the suit while working or sleeping, or else he should have the suit always in a position to be donned in the shortest possible time.

PORTHOLE.—One man in every room must be responsible for the porthole—to see that the deadlight is dogged down at 5 p. m.

FLASHLIGHT.—In every room a dry cell battery light should be hanging on the bulkhead by the door. The room should also be supplied with a flashlight.

STOREROOM.—The storeroom should be unlocked at night.

CIGARETTES.—Since coastwise tankers are not required to carry slop chests, all lifeboats should be supplied with watertight cartons of cigarettes.

RADIO SHACK.—The radio shacks on tankers should be moved aft or an auxiliary set should be installed there. If the tanker is fitted with a mizzen mast, an auxiliary vertical aerial should be rigged.

13. Medical

Be sure you include medical supplies in your abandon-ship package. All seamen, and everyone who may have to abandon ship, should carry at all times a waterproof packet containing at least two ounces of sulfanilamide powder.

SULFANILAMIDE. —R. H. Pilcher, the radio operator of the torpedoed *Anglo-Saxon*, had his left foot mangled by shrapnel. His foot turned green and black from gangrene, which is dead tissue. It swelled to twice its natural size. The stench from it made his lifeboat mates sick. On the seventh day the foot went dead, and on the eleventh day the remains of Pilcher were dropped over the side.

Sulfanilamide, the miracle drug, even administered by unskillful hands, undoubtedly would have saved Pilcher's life.

In the first World War 80% of the men suffering from abdominal wounds were killed by infection. After Pearl Harbor, thanks to sulfanilamide, no service man died from infection. Less than 4% of the compound fractures became

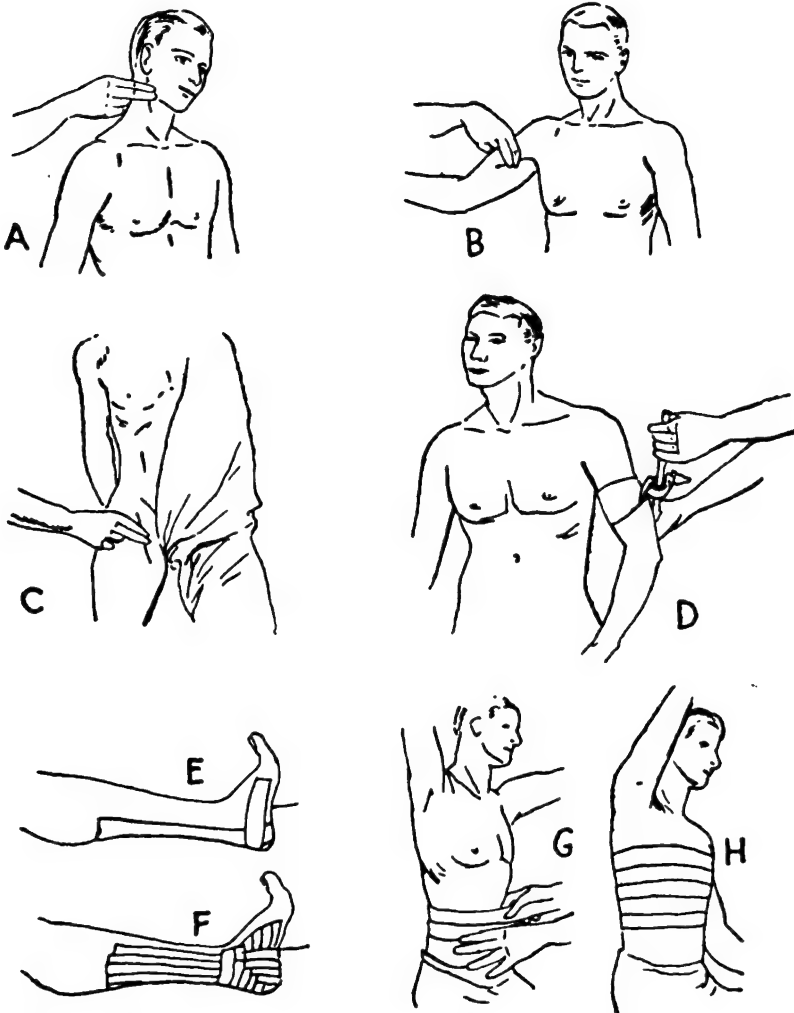
infected, and infection did not cost any man an arm or a leg.

FIRST-AID KIT.—An adequate first-aid kit in a watertight container for a lifeboat should contain:

- Adhesive tape.
- Roller bandages.
- Triangular bandages.
- Sterile bandage compresses.
- Sterile gauze squares—3" x 3".
- Picric acid gauze—for burns.
- Tourniquet.
- Wire or thin board splints.
- Scissors.
- Paper cups.
- Iodine—a disinfectant.
- Oil of cloves—for toothache.
- Aspirin—for fever.
- Bismuth—for diarrhea.
- Sodium bicarbonate—for burns.
- 5% tannic acid jelly—for burns.
- Calamine lotion—for sunburn.
- Mineral oil—for the eyes.
- Aromatic spirits of ammonia—a stimulant.
- Cascara tablets—irritant laxative; takes a minimum of water from the intestines.

ARTERIAL BLEEDING.—While someone is preparing a tourniquet, use whichever of the six following pressure points is needed to stop bleed-

ing. If you can prevent it, never allow bleeding to continue longer than four or five minutes.



A: Point of compression for carotid artery. *B:* For brachial artery. *C:* Femoral artery. *D:* Windlass tourniquet. *E:* Strapping an ankle with adhesive, first step. *F:* Strapping completed. *G:* Strapping broken ribs, first step. *H:* Strapping completed.

Press your fingers on the point indicated. Fingers may also be pressed directly on the wound, since

saving life is the primary consideration, while avoiding infection is secondary.

1. Bleeding from scalp and forehead: Press in front of the opening of the ear.

2. Bleeding from face below eyebrow: Press the side of the jaw just in front of the angle of the jaw-bone.

3. Bleeding from neck or throat: Put your thumb behind the neck, and the fingertips at the side of the neck beside the windpipe and press backward.

4. Bleeding from the shoulder or armpit: Press your thumb downward against the side of the neck behind the collar bone.

5. Bleeding from the arm: Press the inner side of the arm below the armpit.

6. Bleeding from the leg: Stretch the injured person out. Press the heel of your hand into the middle of the groin.

To make a tourniquet: Use a handkerchief, belt, strip of canvas, or any piece of cloth at least two inches wide. Never use a wire or a rope.

Apply the tourniquet about four inches below the armpit or groin. Take two round turns around the arm or leg and tie with a square knot. Insert a stick and twist to tighten the tourniquet. Then secure the ends of the stick.

Be sure the tourniquet is tight. You have to constrict the arteries, which are further below the surface than the veins. Loosen the tourni-

quet every 15 minutes by untwisting the stick. If the bleeding starts again, tighten the tourniquet.

GUNSHOT, SHRAPNEL WOUNDS.—Clean the wound—with sea water, if no other antiseptic wash is available, and you are far enough out to be certain that the water is clean. Debride the wound. That is, you must cut away all the dead and dying flesh, on which germs can feed. Your knife must be sterile—free from germs.

To sterilize the knife, either thrust the blade in the flame of a lantern or match, or dip it in the compass alcohol. The black carbon that collects on the knife from the flame will not do any harm. After sterilizing, do not touch the blade with your hands.

When you have cleaned the wound, dust it with two ounces of sulfanilamide powder. To be effective, the sulfanilamide powder must be put directly onto the wound.

Place sterile gauze or layers of bandage over the wound, and bandage so that the wound will drain freely. Dressings may be sterilized by scorching. Use a heavy dressing for a chest or abdominal wound. The wound must be dressed daily.

If sulfathiazole tablets are available, they may be given by mouth to the wounded person in dosages of two 7½-grain tablets every four

hours. This treatment may be continued as long as the infection shows evidence of advancing.

A mild toxic—poisonous—condition may result from the sulfathiazole treatment. This toxic condition may cause nausea, vomiting, headache, rash, and reduced kidney function. If the toxic manifestations become pronounced, discontinue the sulfathiazole.

Due to its drying effect, sulfanilamide powder checks the healing of the wound after three or four days' treatment. However, under lifeboat conditions, it is advisable to continue the treatment, rather than run the risk of gangrene.

FRACTURES.—Unless a simple fracture is kept immobile, it is liable to become a compound fracture, with danger of infection which may prove fatal. Do not try to set a bone. Merely use traction, that is, exert a slow, steady pull to straighten the limb, turning the hand or foot to a normal position as you pull. Then have an assistant apply splints, while you maintain traction. Except in an extreme emergency, do not move the patient until splints are applied.

Once you have started the traction, do not release it until the splints are in place. Thereafter, fixed traction should be used until a doctor is reached. Fixed traction is a constant light strain on the end of an arm or leg.

In a compound fracture put a tourniquet

loosely around the arm or leg, ready to be tightened in case of arterial bleeding. Paint the compound fracture wound with iodine, cover it with a sterile dressing, and bandage. If the bone is



Within a few days after this photograph of *City of New York* survivors was taken, three of these men were dead. General Djoukanovitch, a passenger, with a handkerchief over his head, succumbed on his fourth day in the open boat. Armando Ferreira, quartermaster, wearing a cork jacket, and William Hannegan, electrician, his back to the camera, died on the twelfth day. Ten persons passed away in this lifeboat, either from exposure, in which the entire body was refrigerated, causing the heart to wear itself out trying to keep up circulation, or from shock (see page 94). The warmth that a life suit provides quite likely could have prevented these casualties. (*Acme*)

sticking out, apply iodine to the bone as well as to the rest of the wound. No harm is done if the protruding bone disappears when traction is applied.

A man with a head injury should be kept lying down. The head should be slightly raised if the face is red, but level if the face is pale. Apply cold cloths to the head. Avoid any pressure on the head wound. Avoid giving stimulants. Keep the person warm. Move him only in a prone position, and avoid unnecessary handling.

SHOCK.—Shock, which may be caused by an injury, exposure, or a severe emotional disturbance, is a condition in which the fluid of the blood spreads out into the tissues. Because of this, the blood concentrates, and this concentration impedes the circulation.

The abdominal vessels dilate, thus increasing the volume of the containers of the blood. When there is more space than blood, the circulation collapses, and the victim of shock actually bleeds to death in his own circulation.

A shock victim often has a fear of impending disaster. His skin becomes clammy. He breaks out in cold perspiration, and his pulse is rapid and feeble.

In treating shock, heat applied to the abdomen or to the sides of the body is the most im-

portant. For this purpose it is advisable to purchase a chemical bag which gives off heat when water is added.

The victim should be placed on his back with his head low, so that blood will flow to the heart and brain. A teaspoonful of aromatic spirits of ammonia in half a glass of water may be given every thirty minutes. Black coffee is helpful. The patient must be kept warm and quiet.

DROWNING.—If you are swimming, never take hold of a drowning person while he is struggling. Wait until he becomes quiet. Approach him from behind. Grab his hair and pull him onto his back. Turn on your back, holding onto his hair or neck, and swim.

In the lifeboat place four oars in a row on the thwarts. Spread the life preservers on top of them, and stretch the person belly down on the preservers. You can also use the bottom of the boat by moving the bread tanks and the water breaker, but this is not advisable in a heavy sea.

Do not take time trying to get the water out of the stomach and lungs. Restore spontaneous breathing by using the simple prone-pressure method of artificial respiration. Keep it up until the person is breathing. People have regained consciousness after four hours of artificial respiration.

To restore breathing: Stretch the person, face

down, full length, right arm stretched forward past the head, left arm bent. Rest the person's cheek on the bent arm.

Straddle the patient's thighs. Put your palms on each side of his back, so that pressure will work the chest like a bellows. Hold your arms straight and bear down. Squeeze all the breath out of his lungs. Hold the pressure, which should be 35 to 40 pounds and never more than 60, while you count three. Swing back, removing the pressure completely.

The patient's lungs will expand, drawing in air. Count three, and apply the pressure again. This action of pressure and release, pressure and release, should be repeated from 12 to 15 times a minute. Each complete movement—bearing down, then swinging back—should occupy 4 or 5 seconds.

BURNS.—Remove clothing over the burned area. If clothing sticks to the skin, cut around it, but do not attempt to remove the part that is stuck.

Apply several layers of sterile gauze soaked in a sodium bicarbonate solution, or moisten picric acid gauze and apply several layers to the burn.

Sterile gauze moistened with a 5% solution of tannic acid provides an excellent treatment. A 5% solution may be made by half-filling a

sterile jar with tannic acid powder and adding fresh water until the jar is filled.

Do not apply iodine to a burn.

Do not use cotton directly on a burn.

A few drops of clean olive oil, mineral, or castor oil may be put into the eyes.

SUNBURN.—A lifeboat is not the place to acquire a suntan. To conserve your body's water supply, as well as to avoid sunburn, keep well covered up, especially on clear days in the tropics. Keep your clothes and hat on, and stay under the boat-cover awning as much as possible.

If you are a blond or redhead, you are far more sensitive to the sun's ultraviolet rays than if you are dark-haired. Give special consideration and protection to the heliophobe—the person who reddens and blisters, but who does not tan.

In a lifeboat your tolerance to sunshine—or the time you may safely expose yourself to the sun—is no more than 30 minutes.

The sun's reflection on the water will burn you just as severely as will the direct rays.

Even on a misty, cloudy day, it is possible to receive a painful burn.

Because of the salt on your face and body, lotions are apt to prove ineffective. If you do

use a lotion, remember that many of them—and probably the one you are using—permit a 50% transmission of the sun's rays to your skin. Therefore, the lotion's value as a protective film will reach the limit of safety after one hour.

Olive oil, cocoanut oil, vinegar, carron oil—equal parts lime water and raw linseed oil—are not effective in the treatment of burns. Linseed oil and lanolin increase the possibility of infection.

Apply talcum to ease first degree burns—identified by bright redness.

For third degree burns, use tannic acid.

Pain may be eased with a 2 to 5% solution of aluminum subacetate. Apply with a compress.

SUNSTROKE.—In the doldrums, beware of sunstroke. It is caused by exposure to the sun's infra-red or heat rays, with humidity and the lack of a breeze as contributing factors. Sunstroke signifies that the heat-regulating mechanism of your body has been thrown out of gear.

Your body's normal temperature is 98.6 degrees Fahrenheit. Sunstroke can run this temperature up to 113 degrees F., which is, of course, fatal.

You are not immune to sunstroke. If exposed to the sun when the air is still, African monkeys, which are used to the heat of the tropics, will soon die.

Fortunately sunstroke is almost always preceded by warning. Headache, dizziness, spots before the eyes and swimming vision, nausea, vomiting, diarrhea, and abdominal pains indicate that you should get under cover immediately.

Loosen your clothing. Have some one fan you. Bathe your face and head. Put your wrists in sea water. Drink water in sips. Rub the skin with water to increase the circulation. Cold tea or coffee will stimulate the circulation.

In case of actual sunstroke, the person should be stretched out under the awning on a bed made of the oars placed on the thwarts. Use the life preservers for cushions. Loosen the clothing. Fan him. Administer aromatic spirits of ammonia, if it is available. Have some one stand at the opposite end of the boat and dash sea water over him. Keep the patient quiet for at least forty-eight hours.

IMMERSION FOOT.—If your feet come in contact with salt water for several days, you are liable to suffer from immersion foot. To treat this painful, swollen condition, keep the circulation active, the legs raised, the body warm. Apply cold compresses. Dust sulfanilamide powder on sores. Do not massage, bandage, or apply heat to the affected parts.

BLAST INJURY.—A person in the water near

an explosion is likely to suffer internal injuries. *Lung injury*: difficulty in breathing; blood coughed up. *Stomach injury*: pain, swelling.

Have the person lie down with his head low. Keep him warm. Give him enough morphine to relieve the pain, enough water to quench his thirst.

HOW TO GIVE MORPHINE.—

1. Take off the transparent shield from end of syrette.

2. Hold the wire by the loop, and push the wire through the needle into the syrette. This will break the seal. Withdraw the wire.

3. Stick the needle under the skin of the arm or shoulder at an angle of 45 degrees. Squeeze syrette until tube is flat.

4. Pull out the needle and throw the syrette away.

5. Additional injections may be given every three hours. If the man is badly injured, double the first dose.

SULFADIAZINE TABLETS.—Give a burned or wounded man one dose of 8 sulfadiazine tablets, but no more.

14. Morale

Do not under-value morale. It is the state of mind which backs you with courage and confidence. The lack of it has proved fatal far more often than the lack of water. The lack of it has killed more seamen than bombs and torpedoes. Morale is frequently the total of little things. Do not slight the trivialities which contribute to it.

CIGARETTES.—Said Eugene Schlaflin, second engineer of the torpedoed tanker *Charles Pratt*: "Luckily we thought of cigarettes and grabbed cartons before we jumped into the boats. I think that saved some of us from going mad later."

There is magic in cigarettes. The crazed second cook who stepped over an open boat's gunwale to go "across the street to buy some pineapples," would probably be alive now if he had had cigarettes to steady him.

If you can do so without jeopardizing your safety, gather up all the cartons in the slop chest. The person in command of the boat must confiscate all cigarettes and ration them carefully. Cigarettes are most important at night

to the men on watch. It is then that they supply the very essence of morale—courage and confidence.

EXTRA FOOD.—If food beyond the usual rations has been salvaged, save it for the periods of gloom. In the *Robin Moor* lifeboat, biscuit crumbs moistened with fresh water, seasoned with sea water, and mixed with canned tomatoes provided a banquet that lifted the men's spirits out of all proportion to the quality of the fare.

Boost up or reduce rations according to the prospect of reaching land. Sighting a ship is no cause for growing reckless with the food. Many vessels, fearing a submarine trap, will not stop for you.

WATER.—Though under the law water is changed periodically and the breaker is cleaned with a solution of baking soda, you may find that your supply is not as fresh as you would like it. Yet it is quite possible to make thirst-quenching in a lifeboat enjoyable.

The sparkling natural water to which you have always been accustomed, has a tang due to the carbon dioxide gas it has absorbed and changed to carbonic acid. If the ship's stores yield up any bottles of charged water, bring them along. A few drops mixed with your ration of unpalatable water will restore some of its flavor.

If a man has a fever or is a diabetic, he requires more water than the others. Allow him an extra ration.

LIQUOR.—Wrote William Bligh in the log of the *Bounty's* open boat: "Being miserably wet and cold, I served to the people a teaspoonful of rum each, to enable them to bear with this distressed situation."

Liquor should be rationed out during squally weather, and to the men on watch during stormy nights.

CLOTHES.—Keep your clothes on when it rains, with dry garments under the boat cover. Even in the tropics it grows chilly during the squalls. The men on watch should have oilskins. A dead man's clothes should be distributed among the crew.

Baker, the third mate of the torpedoed *Prusa*, reported: "Any man from lifeboat #1 can tell of nights of misery beyond belief when a rain squall caught us around dark, and we huddled together all night, praying for the sun. And this was within three or four degrees of the equator."

SAILING.—Remember that the crewmen are used to a ten- or fifteen-knot ship. Unless the lifeboat is kept sailing constantly, their spirits will break. As long as the winds permit you to go in the general direction of your track, keep the boat moving.

LIGHT.—For the first couple of nights use the oil lamp. It will give the men confidence. If you have put up a rail, lash the lamp to it, securing it to prevent swinging. You can hang the lamp to the stays, providing the weather is good.

Be sure the lamp is made fast so it will not swing. A swinging lamp will have an hypnotic effect on the men looking at it. Their eyes will stray back and forth, and they will not be watching what they are doing.

NATURE.—With short rations muscular action of the intestines is likely to be suspended. It is usually possible, therefore, with women in the boat, to take care of this need at night. The bucket is awkward; for a urinal use a small milk can.

TOOTHBRUSH.—A toothbrush not only will help you to keep your mouth from being constantly foul; but also by freshening your mouth, you will ease the sensation of thirst.

BEDDING.—Spread the life preservers on the bottom boards for those who are turning in. With two men bailing, the preservers will aid in keeping the watch below from being soaked through. Hang the preservers up daily, to keep them from becoming foul.

IMPARTIALITY.—From Captain Bligh we quote a method that was time-honored even in 1789:

. "I divided it (a noddy, about the size of a pigeon), with its entrails, into 18 portions, and by a well-known method of the sea, of, *who shall have this*,* it was distributed, with the allowance of bread and water for dinner. . . .

* "One person turns his back on the object that is to be divided: another then points separately to the portions, at each of them asking aloud, 'Who shall have this?' to which the first answers by naming somebody. This impartial method of division gives every man an equal chance of the best share."

RECREATION.—Do not overlook books, magazines, a musical instrument. Richard Phillips, second assistant of the *Robin Moor*, took along his portable radio, and tuned in dance music and news for the crew.

Due to the constant wetness, the deck of cards in Banigan's boat fell apart in three days. Plastic cards would have eliminated the long stretches of boredom that followed. Though more expensive, plastic cards will last longer than fifty decks of paper cards. They are not affected by salt air, water, heat, or humidity. Plastic cards are obtainable in all seaport cities.

SUICIDE.—The suicidal impulse is no stranger among open-boat crews. Yet strong clinical evidence supports the premise that seldom does a shipwrecked man, who commits suicide or has the impulse to do so, actually wish to die!

Since this is so, some understanding of the

insidious trickery which the human mind can play upon its possessor may aid him to stifle the suicidal impulse.

First, the victim of hysteria. He cannot help himself. The man who suddenly starts over the side, saying, "I'm going down to the corner for a glass of beer," is suffering from hallucination, dissociation of time and place, and it is your duty to restrain him.

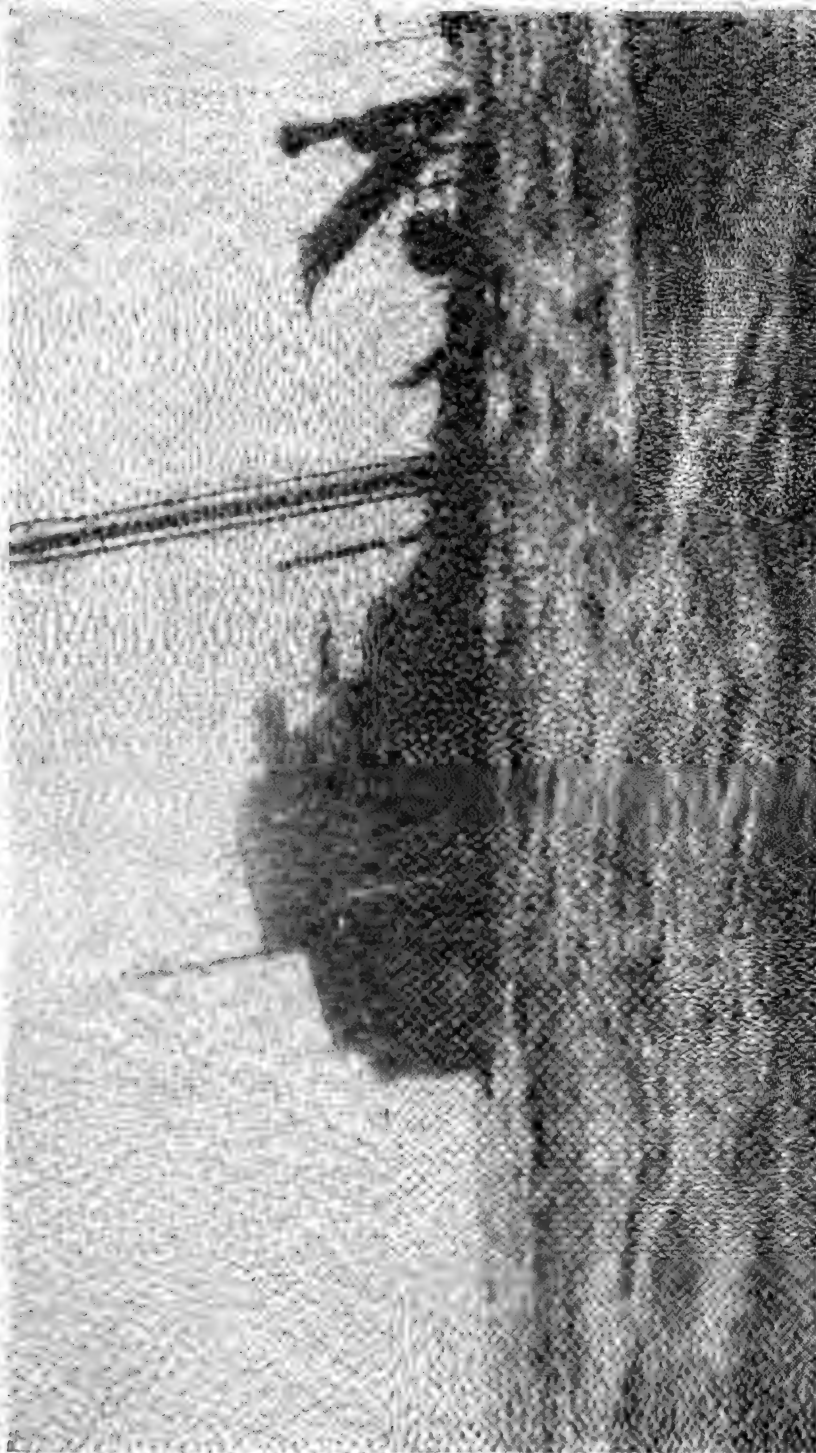
Our concern is with another type of suicide, the real cause of which is obscured by the apparent cause.

What of the man who goes over the side without warning, or who releases his hold on the grab line and is lost? He has sought escape, you say. He has taken a quick exit from an intolerable situation. He could not stand the rough going. Pat explanations, disproved by hundreds of case histories.

Yet the man is dead—and because of his own act. Suicide, self-destruction. True. But agreeing to that does not answer the question.

The real answer is that the man actually died because of his desire to kill an enemy. He died because of his inherent combative instinct, his inborn aggressiveness, his fighting heart!

Strange contradictions, almost unbelievable. But remember, these are facts. We are not quoting dreams.



A boarding party from a patrol ship went aboard this sinking derelict, found no sign of life, and left the vessel to slip beneath the waves. (*International News Photos*)

At one time or another, every man has turned his feeling of hostility against himself. He has kicked himself, cursed himself, shaken his fist in the mirror. With our man, that *reversed hostility* has reached a fatal degree.

Unable to strike back at his foes on the U-boat, unable to revenge himself against the Japs or Nazis who blasted him from the comfort of a steamer to the hardship of an open boat, he—through a tricky mental process of which he is entirely unaware—turned his raging hatred and hostility for the foe against himself! He did not want to die. He wanted to kill!

Accept this explanation. It is backed by lifetimes of clinical research. If you become imperiled by a suicidal impulse, you can fight it down with this knowledge. It is not difficult to swing reversed hostility away from yourself. Take it out on the wind and the sea. Throw yourself into your open-boat duties. A game is a battle. If you are still bent on self-destruction, postpone the act until after a session of poker. We will wager a pretty penny that the cards will change your mind.

BURIAL AT SEA.—*Unto Almighty God we commend the soul of our brother departed, and we commit his body to the deep; in sure and certain hope of the Resurrection unto eternal life, through our Lord Jesus Christ; at whose*

coming in glorious majesty to judge the world, the sea shall give up her dead; and the corruptible bodies of those who sleep in him shall be changed, and made like unto his glorious body; according to the mighty working whereby he is able to subdue all things unto himself.

15. Water and Thirst

Your body is about 70% water. Maintaining the water balance of your body, so as to sustain life, is a far more pressing problem in an open boat than that of refueling your system.

DEPRIVATION.—If the human body is deprived of water for a few days, digestion will stop, toxic wastes will accumulate rapidly. The circulation will grow sluggish, due to the concentration of the blood, and will soon cease.

When deprived of water a person in good health will start to become delirious in about four days. Death will occur in from eight to twelve days; but at sea the shorter time is more likely.

TRUE THIRST.—The burning irritation and the sensation of dryness in the throat and mouth is Nature's signal that your body needs water.

ARTIFICIAL THIRST.—Thirst is not always due to water need. The sensation of thirst can be created by sugar and salt, and even by sweetened or salted beverages. When the water supply is scant, avoid food and drink which contain sugar or salt.

BODY HEAT.—The water in the tissues is protection against excessive body heat. When water evaporates, heat is used up. It is this process—the heat of the body being absorbed by evaporating perspiration—that keeps your body at a safe temperature.

FOOD VERSUS THIRST.—If you have no water supply, do not eat. The elimination of food wastes by the kidneys will draw water from the tissues, and will therefore reduce your survival time.

When you do eat dry food, be sure you nibble at it. The *Robin Moor* men made each biscuit last until the next ration was given out.

TEMPORARY RELIEF.—Moistening the lips and the mouth will ease the thirst sensation. Captain R. H. Cairns, master of the torpedoed British tanker *La Carrier*, allayed his thirst, during the 80 hours he was in the water clinging to wreckage, by chewing on the buttons from his jacket. This stimulated the flow of saliva and moistened his throat.

Chewing on a lemon rind or a piece of gum will increase the flow of saliva and give temporary relief. But this relief will not reduce your urgent need for water.

EVAPORATION.—A great amount of water is lost by the evaporation of perspiration. Keeping the body well covered, to protect the skin

against the sun and wind, will lessen the body's water loss and will add to your survival time.

DOUBLE-DUTY FOODS.—In gathering your abandon-ship rations make every possible effort to obtain double-duty foods.

Water Content of Vegetables

Sweet Potatoes, 68%

Potatoes, 77%

Kale, 86%

Onions, 87%

Beets, 87%

Carrots, 88%

Turnips, 90%

Cabbage, 92%

Spinach, 92%

Radishes, 93%

Tomatoes, 94%

Lettuce, 94%

Squash, 95%

RAIN.—To collect rain water with the sail: Release a stay. Bring the sail to the after part of the mast. Raise it on a slant, with men on each side. Allow the rain to clear away the salt, before you begin collecting water.

After deprivation, be sure you drink in small sips. Robert Tapscott, from the torpedoed British freighter *Anglo-Saxon*, drank three canfuls of rain water, after a long drought. His constricted stomach revolted and sent the water up.

BREAKERS.—If possible, double up on the breakers.

RATIONS.—Three 6-ounce cups of water a day are sufficient even in hot weather. Except for infrequent rains, each member of the crew of the *Prusa's* #1 lifeboat lived 31 days on 12 ounces of water a day.

SEA WATER.—Robert Emmett Kelly, the only survivor of a tanker torpedoed in the Caribbean, reported that his shipmates drank sea water. It made them sick and did not ease their thirst. What they did not know was that it also hastened their death.

Leslie Morgan, second cook of the torpedoed *Anglo-Saxon*, drank can after can of sea water. He went out of his mind and soon dived overboard.

Sea water has a salt content of $3\frac{1}{2}\%$. That is equivalent to a full teaspoon of salt in a six-ounce cup of water.

The salt content of sea water is three times greater than in human blood. Drinking sea water will exaggerate thirst, and will promote water loss through the kidneys and the intestines, thus shortening your survival time.

URINE.—Under the conditions of water deprivation, urine is too concentrated to be drunk. Its toxic waste products will add to the agony of thirst, contribute to dehydration, and lead to

excessive body heat of 105 degrees and over. Drinking urine will cut down your survival time.

ALCOHOL.—Alcohol will promote water loss through the skin and kidneys. Drinking alcohol under the conditions of water deprivation is suicidal.

FATS.—A highly fat food will supply more water and cause less water loss through the kidneys than will meat or starchy foods.

When no food is consumed during water deprivation, energy must be obtained from the body's own fats and proteins. In the process of turning the body's fats and proteins into energy, water is manufactured, and this body-made water helps maintain kidney activity. Therefore, you can see that by fasting during water deprivation, you will actually prolong your life.

FREEZING.—If you are in freezing weather, it is possible, provided you have a means of melting ice, to obtain water which may be safely drunk.

Put a few quarts of sea water in an air tank. The pure water will freeze first. The salt will collect in high concentration in the core of the frozen piece. Dispose of this core, which is likely to be slush ice and easy to remove, and by melting the outer portions, you will have water sufficiently free of salt to sustain life.

ICEBERGS.—When a part of a glacier reaches the sea, it breaks off and forms an iceberg. The glacial ice of a berg comes from snow, and is the source of fresh water.

FIELD ICE.—When sea water freezes, the salt is forced to the top, and during thaws and rains, this salt is washed away, leaving ice that may be melted for drinking water. To obtain fresh water at sea, use last year's ice, or older.

<i>Last year's ice</i>	<i>This year's ice—Salt ice</i>
1. Rounded corners due to rains and thaws	1. Grayish in color
2. Bluish in color	2. No glare
3. Has a glare	3. Tough
4. Splinters easily	4. Splinters less easily
5. Saltiness hardly noticeable	5. Salty

WATER FROM FISH.—Offshore fish are a source of drinkable water. After removing the bones, cut the fish in small pieces. Wrap the pieces in cloth and squeeze out the juice into a container. You can also quench your thirst by chewing the fish and sucking out the juice.

SULFA DRUGS.—Do not give any sulfa drug by mouth to a person suffering from thirst.

RUST.—Rust in the water will do you no harm, unless you swallow bits of metallic flakes.

16. Food and Hunger

The point to remember in selecting your extra abandon-ship rations is that your body is equipped to manufacture energy for a long time, while its water supply must be replenished frequently. If you have to choose between a food with a low calorie value but a high water content, and one that is high in energy but low in water—take the food with the water.

SURVIVAL TIME.—If you are in good health, you can live without food for as long as sixty days, though open-boat conditions probably would cut that time down to fifty days.

HUNGER.—The sensation of hunger is caused by the muscular contractions of the empty stomach. This sensation will continue throughout the period of fasting.

CALORIES.—A calorie is a unit of heat, by which the energy value of food is measured. In the doldrums your body will use up about 2000 calories a day; in rough weather, 3500 calories or more.

ENERGY VALUES.—While the water content should be your first consideration in the selection

of food, it is advisable to add, if possible, some of these compact foods, which have high calorific—or energy—value. The figures given here denote calories per pound.

Jam, 1300
Condensed Milk, 1500
Cheese, 1800
Cocoa (Drink), 2100
Dried Whole Milk, 2100
Chocolate Candy, 2500
Chocolate (Drink), 2500
Milk Chocolate Candy, 2600
Cocoanut (Dried), 2600
Walnuts, 3300
Butter, 3500

WATER CONTENT.—The foods with a high water content will provide very little energy. The figures here denote calories per pound.

Onions, 90
Turnips, 100
Carrots, 200
Potatoes, 370

Canned Tomatoes, 100
“ Carrots, 200
“ Apricots, 470
“ Peaches, 470
“ Pineapple, 470

ALCOHOL.—Liquor contains considerable en-

ergy, but its function in an open boat is to sustain morale during night watches and in cold and squally weather. These figures denote calories per pint.

Gin, 1280

Whiskey, 1300

Brandy, 1350

Beer, 180

BODY FAT.—The fat in your body is stored energy. One pound of your body fat, burned up by your system, will provide 3500 calories, or sufficient energy to carry you through a day of rough weather in an open boat.

COLD WEATHER.—Sugar and fats are rapidly absorbed by the tissues, and supply a quick source of heat and energy. Foods rich in sugar and fats should be rationed during cold weather. Butter, cheese, dried milk, nuts, cocoanut, chocolate and cocoa drinks are rich in fats. Chocolate candy performs double duty, being rich in both sugar and fats.

NIGHT WATCH.—Cocoa contains a stimulant called theobromine, which resembles coffee's caffeine. On a gloomy night watch, cocoa, along with a cigarette and a ration of liquor, will prove a morale builder.

FISH SPEAR.—Should your trip be prolonged, you will often find that the water around you, particularly in the tropics, is boiling with fish.

Fishing with a hook and line is not practicable. Your hook either will be taken by a large fish, which will snap your line, or a small fish, which will be devoured before you can draw it in.

If you have a long, slender stick and a knife, you can fashion a spear which will serve you well. But do not weaken the structure of your boat by cutting away any part of it to provide your shaft.

FISH.—The flying fish which glide into your boat, and the fish you catch, may be eaten raw. But do not make Captain Bligh's mistake:

June 9, 1789

At four in the afternoon we caught a small dolphin, the first relief of the kind we obtained. I issued about two ounces to each person, including the offals, and saved the remainder for dinner the next day.

June 10, 1789

This afternoon I suffered great sickness from the oily nature of part of the stomach of the fish, which had befallen to my share at dinner.

Harold F. Dixon, the Navy flier, reported that he and his two crewmen were able to catch a small shark. They ate the shark's liver and two sardines found in its stomach, and drank the blood.

The seaweed along all the coasts supports a great population of tiny shellfish. These may be eaten.

Robert Emmett Kelly reported that one of his lifeboat mates ate a jellyfish, became deathly sick, and jumped overboard.

RAW FISH.—Bring along some bottles of lime juice. If you catch a fish, and have no means of cooking it with fire, use this Tahitian recipe. Clean the fish and cut it into small chunks. Put the chunks in a Mason jar or other glass container. Do not use tin. To one part sea water add two parts lime juice. Stir and pour over the fish, covering it entirely. Let it stand for eight hours. The citric acid will cook the fish and provide you a much-relished South Sea delicacy.

TROPICAL FISH.—Extreme care must be taken in eating fish in the tropics. In the vicinity of coral islands, for instance, nearly all the fish are at times poisonous, and the liver from one species of shark is deadly poisonous at all times.

FLYING FISH.—In areas where flying fish are plentiful, they are easily caught with a torch and a spear or a landing net. The light is thrown on the water thirty or forty feet from the boat. The fish come skipping across the water like a flat stone thrown along the surface. They will bang against the side of your boat, or fall in the water and lie blinded on the surface.

Baker, the *Prusa's* third mate, caught over 100 in one hour of fishing from a canoe near

the Gilbert Islands. He used torches made of dry coconut leaves, and a landing net.

In a lifeboat a few may be caught by hanging a mirror, or anything that glitters, along the gunwale when the moon is bright.

DRIED FISH.—In the tropics, if water is plentiful, raw fish may be prepared by cutting them into thin slices, soaking the strips in sea water, and hanging them in the sun. This method should not be used unless water is plentiful, as the salt fish will induce thirst.

EELS.—Eels are edible. They swim under water, have no scales. Poisonous sea snakes swim on the surface, have scales.

RAWHIDE.—Rawhide contains considerable food value and will not make you ill. But be sure it is rawhide. Commercially tanned leather is not to be used as food. Either boil the rawhide to a jelly-like consistency, or cut the hide into small pieces and swallow them.

PEMMICAN SOUP.—Mix your ration of pemmican with water, and heat. Then break your ration of biscuit into this soup.

DRIED SALMON.—Salmon, dried by native Alaskans, is an excellent and delicious food.

SUET STEW.—Boil rice, chocolate, and chopped-up suet together in plenty of water. This was a favorite dish with the men in Stefans-

son's third Arctic expedition. For a day's ration: $\frac{1}{2}$ lb. rice, $\frac{1}{2}$ lb. suet, $\frac{1}{4}$ lb. chocolate.

To economize on fuel—bring the mixture to a boil. Then place the can on wood, a non-conductor, and wrap in a blanket. Allow the stew to cook by this fireless method for twenty minutes.

BIRDS.—The albatrosses he and his crew caught, Captain Bligh considered "not inferior in taste to fine geese." The albatross caught by the *Prusa's* crew proved to be so tough and had such a foul odor that it could not be eaten. However, the flying fish taken from its stomach were delicious.

If you have provided yourself with a sling-shot, or the materials to make one, it will not take any great skill to bring down some of the birds which will fly near you.

Another method of catching birds is with a long-thonged cat-o'-nine tails.

SEAWEED.—Laver, Irish moss, and agar are used as human food; but unless you have a plentiful supply of water, you are advised against trying to obtain nourishment from seaweed. Not only are seaweeds tough and salty, but they also absorb large quantities of water, and about all you will obtain from chewing on them is an intolerable thirst.

VITAMIN DEFICIENCIES.—If your gums bleed

and have a bruised appearance, you have a touch of scurvy, caused by a lack of vitamin C, which is found in fresh fruits and vegetables.

The inability to see well in a dim light indicates night blindness, the result of vitamin A deficiency. Vitamin A is found in carrots, peaches, cod liver oil, butter, eggs, milk, beef liver.

The peeling and scaling of your skin, knee jerks and other evidences of nervousness, which may or may not be accompanied by headaches, spinal pain and melancholia, show that you are a victim of pellagra.

These symptoms are mentioned merely so you will not burden yourself with worry over the thought that you have a dangerous disease.

Scurvy, night blindness, and pellagra are the diseases of wrong diet. Soon after you reach land, proper food will cause any of these symptoms to disappear. Forget them and sail your boat.

17. Wind and Rain

The information in this chapter is chiefly to help guide you if the Pilot Chart has been lost from your lifeboat. It will give you some knowledge of what winds you may expect in your latitude, so that you will not be misled by a short variation from the prevailing wind.

The rainy seasons are given to guide you in the rationing of water.

If the prevailing wind is blowing in the direction of enemy territory, the section on the rigging and use of a spritsail is of vital importance to you.

PILOT CHART.—For the price, you cannot obtain more information regarding winds than from a U. S. Hydrographic Office Pilot Chart. Again you are urged to provide yourself with Pilot Charts—at 10¢ a sheet—as insurance against the possibility of the chart in your lifeboat being lost.

To understand the information on the Pilot Chart, no knowledge of meteorology is needed.

Knowing your approximate position, you will be able to find out the average velocities of

winds in your vicinity, and their directions. The trade wind boundaries are distinctly marked.

BEAUFORT SCALE.—You will need this scale in reading the wind roses on the Pilot Charts. The number of feathers on a wind-rose arrow shows the average force of the wind on the Beaufort scale.

<i>Force</i>	<i>Wind</i>	<i>Velocity, miles per hour</i>
0	Calm	Less than 1
1	Light Air	1 — 3
2	Light Breeze	4 — 7
3	Gentle Breeze	8 — 12
4	Moderate Breeze	13 — 18
5	Fresh Breeze	19 — 24
6	Strong Wind	25 — 31
7	High Wind (mod. gale)	32 — 38
8	Gale	39 — 46
9	Strong Gale	47 — 54
10	Whole Gale	55 — 63
11	Storm	64 — 75
12	Hurricane	Over 75

TRADE WINDS.—The trade winds are steady winds which blow constantly in the same direction. They are caused by differences in temperature between the polar and equatorial regions.

The trade winds blow from subtropical belts of high pressure toward equatorial belts of low pressure. These belts encircle the earth, and

range from 3 degrees N to 35 degrees N, and from the Equator to 28 degrees S. They make seasonal shifts north and south.

The heat in the equatorial region causes the air to rise. Surface currents from cool north and south latitudes flow into the equatorial region, replacing the ascending warm air.

In the North Atlantic, from 20 degrees N to 30 degrees N, south of the Azores and west of Madeira, the NE trade winds blow strongly in summer. These NE trades are especially strong near the Canaries and the Antilles, and can be felt as far north as Gibraltar.

The SE trades blow weakly in the summer months. They are strong during winter, especially along the North Brazilian Coast.

MEAN LIMITS.—The limits of the trade winds vary each quarter—every three months.

For instance, the mean—or average—of the southern limit of the NE trades is 2 degrees N during the first three months of the year, 4 degrees N the second quarter, 10 degrees N the third quarter, and 6 degrees N during the last quarter.

The northern mean limit ranges from 25 degrees N to 30 degrees N, and decreases for the last half of the year.

If you lack a Pilot Chart, you can apply the above variations to the following mean limits—

to determine approximately how far the trade winds in your area, and in whatever season you are sailing, will take you.

North Atlantic

Southern Belt 2° N — 10° N

Northern Belt 25° N — 30° N

South Atlantic

Southern Belt 30° S — 25° S

Northern Belt 0° — 5° N

North Pacific

Southern Belt 8° N — 12° N

Northern Belt 25° N — 30° N

South Pacific

Southern Belt 30° S — 25° S

Northern Belt 4° N — 8° N

South Indian

Southern Belt 30° S — 25° S

Northern Belt 15° S — 0°

MONSOONS.—The monsoons are winds which blow over the Arabian Sea, Bay of Bengal, China Sea, and along the coasts of Asia. The NE or dry monsoon blows in winter; the SW or wet monsoon blows in summer.

DOLDRUMS.—The doldrums are equatorial belts or areas where light airs, calms, clouds, and rain prevail.

HORSE LATITUDES.—When the heated, rising currents of air of the equatorial region reach an altitude above that of the polar atmosphere,

these currents form a horizontal current which flows toward the poles, just as water flows downhill. In the temperate latitudes this current of air cools; in the horse latitudes are some descending air currents, fine weather, light and variable winds. The equalizing of atmospheric pressure in these regions results in a calm.

That is why, in the Tropics of Cancer and Capricorn, you may come upon large ocean areas where there is no wind for days.

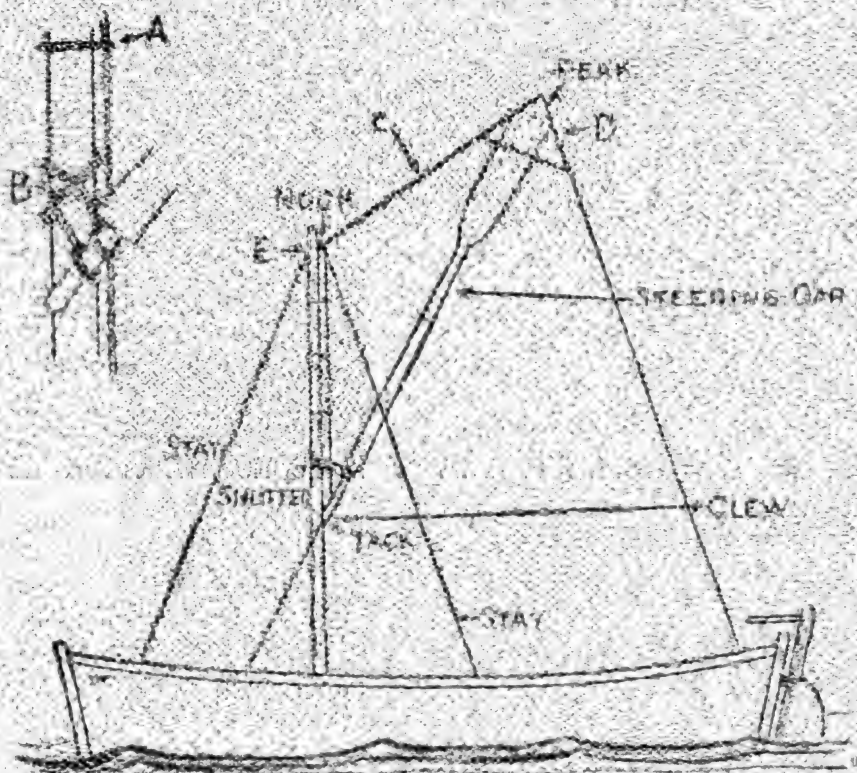
WESTERLIES.—Westerlies are the prevailing winds you will encounter in the high latitudes. However, you may at times encounter winds blowing north and south; but the general average in high latitudes will be Westerlies.

The high pressure belt in the south contributes strong NW to W winds over an area from 35 degrees S to 65 degrees S. These Westerlies are encountered around the Horn and the Cape of Good Hope. This area, in which storms are frequent, has been dubbed the "Roaring Forties."

In the corresponding latitudes of the North Atlantic and North Pacific, Westerlies also prevail.

SPRITSAIL.—If you are near enemy territory and find that the wind is carrying you in that direction, it is advised that you change your lug sail into a spritsail.

A sprit will allow you to point a little higher to the wind, which will enable you to tack to better advantage than is possible with a lug. However, with a sprit you will not make much speed. For a long distance use a lug sail.



A spritsail rigged from a dipping lug. A: Piece of marlin or grommet made fast around mast and through fore leech bolt rope. B: Clove hitch left open. Eyes on end of splitter fit snugly on oar handle. Two round turns can also be used. Weight of oar will prevent splitter from slipping. C: Yard removed from head. D: Pocket sewed to fit blade of oar. E: Halyard is bent on the nock.—A jib may be added for greater efficiency.

To change the lug sail to a sprit: Remove the yard. Sew a piece of canvas across the peak—the

after top corner of the sail—so as to form a pocket. Bend the halyard onto the nock—the forward top corner of the sail.

Bend two or three lengths of marlin or grommets to the luff of the sail, and fit them around the mast.

With 9 or 12 thread make a snotter—a short line with an eye splice on each end.

Make two round turns or a clove hitch around the mast with the snotter—so that the eyes come together.

Fit the blade of your steering oar into the pocket. Put the handle of the oar through the eyes of the snotter. (*See detail in drawing.*)

Bend the tack—the lower forward corner of the sail—to the mast and secure.

Haul in the slack of the sheet.

Now you have a fore-and-aft sail which will allow you to tack with much more efficiency than with a lug.

RAINFALL.—In rationing your water, it is well to remember that you may have squalls all around you, without a bit of rain coming your way.

RAINY SEASONS.—The following list is given to help you in the rationing of water on a long open-boat trip. You may find yourself short of water in one of these areas, and with no sign of

water in the sky, even though the rainy season may be about to start.

Caribbean Sea, June

Brazil, northern, January to April

Brazil, May to September

West Indies, July to October

Africa, west coast, S of equator, November to April

Africa, west coast, N of equator, May to October

Hawaiian Islands, December to April

Ecuadorean coast, December to April

South Pacific Islands, November to April

Mexico, Central America, June to October

Arabian Sea, May to September

Bay of Bengal, May to September

China Sea, May to September

18. Freezing Weather

Your best insurance against exposure and frostbite is a life suit. If you are wearing heavy underclothing, a life suit will keep you warm in the coldest weather. Ten persons died from exposure in a *City of New York* lifeboat. Life suits undoubtedly would have saved several of them, and perhaps the entire ten.

The seamen from the torpedoed Norwegian motor tanker *Alexandra Hoegb* were rescued after 38 hours in open boats during midwinter in the North Atlantic. They reached shore well and healthy. All of them would have been frost-bitten, and some of them would have died—if they had not worn life suits.

FROSTBITE.—Frostbite is a mild term for a very serious and painful affliction. Robert M. Peck, who survived the *City of New York* torpedoing, suffered second degree frostbite, characterized by blisters and a deeply reddened skin. For weeks he was unable to get a night's sleep, and he was incapacitated for three months.

Frostbite is caused by the action of cold on

the body tissues. This action blocks the circulation and deprives the affected area of its blood supply.

DEGREES OF FROSTBITE.—1st: skin dark-red; affected area painful. 2nd: skin bright red or livid blue; blisters. 3rd: affected area white, stiff, brittle; danger of gangrene.

CONTRIBUTING CAUSES.—Fatigue is foremost among the contributing causes to frostbite, due to the vitality being lowered and the circulation slowed. Hunger, malnutrition, vitamin deficiency increase one's susceptibility to frostbite.

WIND.—Wind increases the danger of frostbite. In a lifeboat a windbreak should be rigged, and everyone should be kept under the boat cover as much as possible.

MOISTURE.—Chilling through wet clothing will cause frostbite more quickly than if the cold reaches the body through dry garments.

PERSPIRATION.—Though waterproof shoes should be worn, they retain the perspiration, which will hasten frostbite.

GREASE.—Grease spread over the body will not protect you from the cold. Grease will make your clothes less protective by filling the air pockets, which are the real source of warmth. In a high wind, grease on the face will prove helpful, but it is useless in still cold. A small amount of oil may be applied to the feet, and

rubbed in until the surface is dry. A large quantity will prove harmful.

CLOTHING.—Warmth from your clothing is supplied by the air pockets between the fibers and the air layers between the layers of clothing. These air layers prevent too much heat from getting out and too much cold from getting in. Clothing should not constrict. Avoid tight garters and tight shoes. Loosen the shoe strings. Wear two or more pairs of socks—woolen over cotton.

WOOL AND FUR.—Woolens and furs offer excellent protection against the cold because non-conducting air pockets are formed in the meshes, and these air pockets provide insulation between the skin and the outer temperature.

HAIR.—Excellent protection against cold is provided by the hair on your head.

BEARD.—Moisture from the breath will congeal on the beard, forming a face mask separated from the skin by one-eighth of an inch of air space. If your face begins to freeze, you may not know it. The ice mask will make it difficult to get to the cheek to warm it with your hand. Keep clean-shaven.

TOBACCO.—Tobacco tightens the blood vessels and increases the susceptibility to frostbite by decreasing the circulation.

COFFEE.—Coffee also tightens the blood ves-

sels, and will further reduce the lowered temperature of the affected part.

SYMPTOMS.—By making grimaces, you can detect any stiff spot on your face. Those in a lifeboat should watch one another for signs of frostbite. Be on the alert for these signs:

1. Drop in circulation. If the skin does not whiten when you press it with your finger, the blood supply is below normal.

2. Loss of heat. Determine this by touching an exposed part and a protected area. If the affected part feels colder, frostbite has set in.

3. Numbness. The loss of sensation is extremely dangerous, because the frostbite may eat into the flesh to the bone without you knowing it.

4. Lessened function of the parts, or the inability to use them.

5. Color change. A red and purple mottled appearance is evidence of frostbite. In an advanced stage, the part becomes gray-white.

TREATMENT.—Restoring circulation to injured tissue should be done in gradual stages. Warm the frostbitten area against a part of your own body.

Face: Warm with your hand.

Wrist: Grasp wrist with the other hand.

Hand: Place on naked chest or under the armpit.

Foot: Place against naked part of a companion's body.

In first degree frostbite, the part may be rubbed gently. There must be no rubbing in more severe frostbite. If possible, apply cold cloths, raising the temperature a degree or two every few minutes.

After circulation has been restored, apply boracic acid ointment, or an ointment composed of vaseline one ounce, camphor six grains. The blisters should be pricked with a needle, but do not remove the skin. Cover with cotton or flannel cloths.

If gangrene has set in, wet cloths with alcohol and place over the affected part to prevent infection.

BOAT COVER.—In freezing weather the cover must not be taken off the boat. Rain or snow, freezing in the bottom of the boat, will make it difficult or impossible to put in the plug, and will freeze fast other gear so as to hinder you.

WATER BREAKER.—To keep the water in the breaker from freezing, remove the plug. Insert a stick in the breaker. The lower end of the stick should be weighted, and the upper end should protrude a foot or more. The movement of the ship will keep the stick in motion so that ice will not be able to form.



An example of overloading, which in this case was unavoidable. Ninety of their shipmates perished from the cold. Life suits would have saved most of them. (*Arms*)

In port, put the breakers in the fidley to keep the water from freezing.

FROZEN FOOD.—If you are in freezing weather, it is advisable to have certain foods prepared and stored in the reefer, ready to be transferred to the lifeboat.

Potatoes, eggs, and apples may be kept frozen, but they must be used as soon as they are thawed.

Milk is convenient to handle if frozen in bricks or cubes.

Cut meat into steaks or small roasts before freezing. Frozen meat may be cut with an ax or a saw. Save the meat splinters and sawdust.

Bacon fat is delicious, and in extreme cold it will freeze clean so that your mittens will be no more than slightly stained in handling it. At zero butter is clean to handle, while at 30 below lard may be handled in chunks.

Baked beans may be frozen in bricks, but beans will be easier to heat if you bake them dry and freeze them in separate kernels. Put a little water or grease in your can, pot, or cup, and warm them over a canned heat fire. Beans baked with pork will keep for several months, though the pork may have a slightly rancid taste.

MEAT.—For one year Stefansson lived entirely on meat and water. He found that $1\frac{1}{3}$

lbs. of lean and $\frac{1}{2}$ lb. of fat daily were sufficient.

FAT.—Fat is the top heat-producer because it is quickly absorbed into the tissues, and has more calories per unit of weight than any other food. If you are deprived of sugar and starch, you will soon develop a taste for fat, unless you are the one person in a hundred who cannot eat it. You can die from continued overeating of lean, but your digestive system will prevent you from overeating fat.

PROTEIN POISONING.—Many men in the Arctic have died of starvation, despite a plentiful supply of meat. A diet of rabbit alone, for instance, will leave you hungry no matter how much you eat. In a few weeks a person trying to subsist on such a diet will die of protein poisoning.

You cannot live on lean meat alone. You must have fat. Cranes, owls, ravens, and ptarmigan have insufficient fat.

POLAR BEAR.—If you are in the Arctic regions armed with a high-powered gun, you may find it possible to shoot a polar bear. The bear will not be able to see you at a distance greater than 300 yards. You should use soft-nosed bullets, and your aim should be for a place just behind the shoulder, so that the bullet will pierce the heart. Do not shoot a polar bear while it is in the water. You will not be able to haul it out.

It is advisable to eat bear meat raw and frozen, or half frozen. Bear meat becomes stringy when it is cooked. It will get between the teeth and make the gums sore. Avoid polar bear liver. Sometimes it is slightly poisonous, and will cause vomiting and give you a bad headache.

CARIBOU.—The choice part of a caribou is the head. The ribs, neck, shoulders, heart and kidneys are eaten. The natives feed the liver and sweetbreads to the dogs. The fats may be dried, and the marrow is eaten raw.

SEAL.—Seals are to be found under sea ice, on top of it, and in open water between floes. Most seals shot in the head will float. With body wounds, three out of ten will be lost.

All parts of the seal, except the entrails, may be eaten. The heart and kidneys are choice. The liver may be boiled or eaten raw.

19. Shipboard Precautions

The more precautions you take before an emergency arises, the more chance you will have of survival after the torpedo strikes.

ALARM SYSTEM.—An adequate alarm system is vital to the crew's safety. A torpedo explosion usually sounds like a deep thud, and men awakened by it may not understand what woke them up. Their confusion may cause delay which can be fatal.

Antonio Barros, second cook from a torpedoed freighter, said: "When I woke up, the ship was all to one side."

A. H. Nehl, oiler on a torpedoed troopship, reported: "The buzzer alarm system could not be heard by everyone and drills were not fully attended because of it."

The alarm bells did not ring on one ship until five minutes after the torpedo struck.

AUXILIARY ALARM.—Since the alarm system may be knocked out of commission by the explosion, be sure your ship has a hand-operated auxiliary alarm.

SAND.—Boxes or buckets of sand should be stowed near the lifeboat davits. Then if the torpedo explosion showers the boat deck with oil, the sand can be used to reduce the difficulty in lowering the boats.

SPIGOTS.—Be sure that all spigots are removed from the wooden water breakers. Under wartime conditions they are very apt to be damaged.

BUNG PLUGS.—Tack canvas strips over the bung plugs in your wooden water breakers. Otherwise, if a torpedo strikes, the concussion is likely to drive out the plugs.

TOGGLE.—Attach the toggle pin lanyard to the boat, not to the eye of the painter. Then, when the pin is pulled, it will not strike anyone if the taut painter snaps upward.

COMPASS CARD.—Ask to have your lifeboat equipped with a compass whose card has luminous markings.

RELEASING GEAR.—Be sure you know the location of the releasing gear, and how to operate it. Paint the handle white so you will not lose any time in finding it.

STEERING OAR.—Paint the steering oar a different color from the other oars. Then even an untrained person will have no trouble locating it.

OAR MARKING.—In the darkness it is difficult to determine the position of the blade of your

oar. You are apt, therefore, to catch crabs, that is, skim the surface or sink the blade too deeply. To help avoid these faults, plane a flat spot near the handle to run parallel with the blade. Then by touching this flat surface you will know the position of the blade.

ROPE BELT.—Carry with you at all times a rope belt with a hook attached. If you are in the water, you can hook onto a lifeline or the grab rail of an overturned boat. The risk of losing hold due to fatigue or shock will be avoided.

William Kneer, A. B., reported that the radio operator from a torpedoed Standard Fruit ship could not hold onto the rail of a corvette because of an injured arm. Rescuers could not get a grip on him in time. He was washed into the sea and drowned. With a rope belt and a hook, he could have been saved.

LIFE PRESERVER LIGHT.—Be careful that brushing against anything aboard ship does not cause your life preserver light to be turned on during a blackout.

EMERGENCY WHEEL.—William R. Schutz, A. B., advised: "Some one should stand by the emergency wheel aft, in case the bridge is shot or blown away in an air raid."

BRIDGE BELL.—Striking the bridge bell should be omitted while at sea.

OILED DECKS.—Do not oil the decks at sea. In an emergency men are liable to slip and injure themselves.

PAD-EYES.—Deck pad-eyes, vent pipes, steam smothering lines, mushroom ventilators, and all projections which may be tripped over in going to your boat station, should be painted white. Memorize the location of these projections, to reduce your chance of falling over them.

DOORS.—Charles Peterson, seaman from the torpedoed *Robin Hood*, advised: "Always keep stateroom door and alleyway doors open, because the explosion may alter the ship's structure sufficiently to jam all doors."

BLACKOUT CURTAINS.—Never enter or leave a lighted alleyway at night without being sure that one curtain is in place. Men following each other through the blackout curtains often part both curtains at once, revealing light to the outside.

LUMINOUS TAPE.—Luminous tape will lose its glow unless exposed to light. In alleyways place the tape near electric lights where it can be re-activated.

EMERGENCY LIGHTS.—Charles A. Wilcox, second cook on a torpedoed ship, reported: "There should have been emergency lights in the alleyways. Men were delayed in getting to the

lifeboats because of darkness. Crew had removed the lights. The lights should be fastened down."

LIFELINES.—If there are no handrails, lifelines should be rigged in the alleyways. Then it will be much easier to walk if the ship is going down by the head or stern.

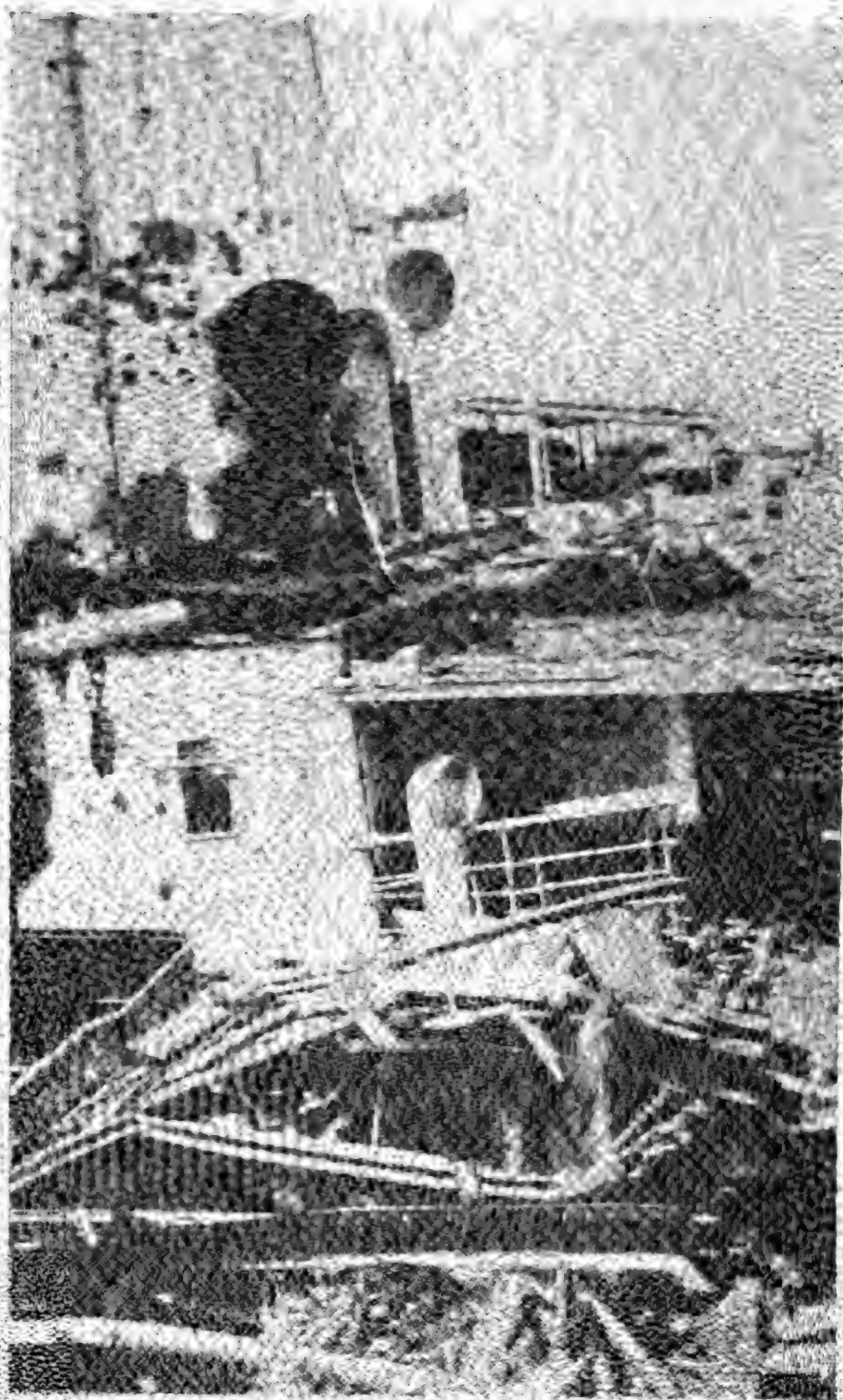
FIRE EXTINGUISHERS.—Be sure you know the location of all the fire extinguishers, because an explosion is likely to make some of them useless. Foam extinguishers in the vicinity of a torpedo blast will probably be set off by the concussion.

UNIFORM CAPS.—During an attack officers should not wear their uniform caps. Their caps have made many officers targets for enemy guns.

COTS.—If your ship is supplied with cots, use one to sleep on the boat deck, while crossing the mid-ocean danger gap or when the vessel has lost its convoy. Then you will not be trapped in your quarters.

SLEEPING ON HATCH.—Never sleep on a hatch. George Taylor, bosun of a torpedoed ship, reported that a seaman sleeping on a hatch was hurled into the sea by the force of the blast, and lost.

Chandler Johnson reported that the wireless operator was dozing on #3 hatch when the torpedo struck. The radio man was blown into the air along with hatch covers and cargo.



The damage done by the Japs to this Yangtze River steamer reveals the small blast area of a medium-sized bomb. (Acme)

An idea of what can happen to you, if you sleep on a hatch, is offered by Wilfred J. Charette, who reported that the heavy steel hatch beams were flung by the explosion from the main deck onto the boat deck.

BOMBS.—If bombs are dropping, fall flat on deck and cover your head. Lying against a bulwark, bulkhead, or hatch coaming will lessen exposure to shrapnel and blast waves. Heavy clothing will cut down the danger of blast injury by cushioning the impact of the blast wave against your body.

During the Jap onslaught on United Nations shipping in the Bay of Bengal, all the men on deck of the *Bienville* were killed by shrapnel from exploding shells. They had failed to use the simple precaution taken by the men on the boat deck of the nearby *Ex-Moor*, none of whom was killed. Every time a shell came over, the *Ex-Moor* men threw themselves flat on the deck.

20. Lookout

Stand your lookout as though yours were the only pair of eyes aboard the ship. This need for constant alertness is illustrated by an incident aboard the *Lancaster*. A floating mine lay in the water a few feet away from the ship on the port side. Two men on the bow, a man on the port wing of the bridge, and three men on the flying bridge failed to see it. The lookout who did report the mine was the only one who could have been excused for not seeing it. He was stationed on the starboard wing.

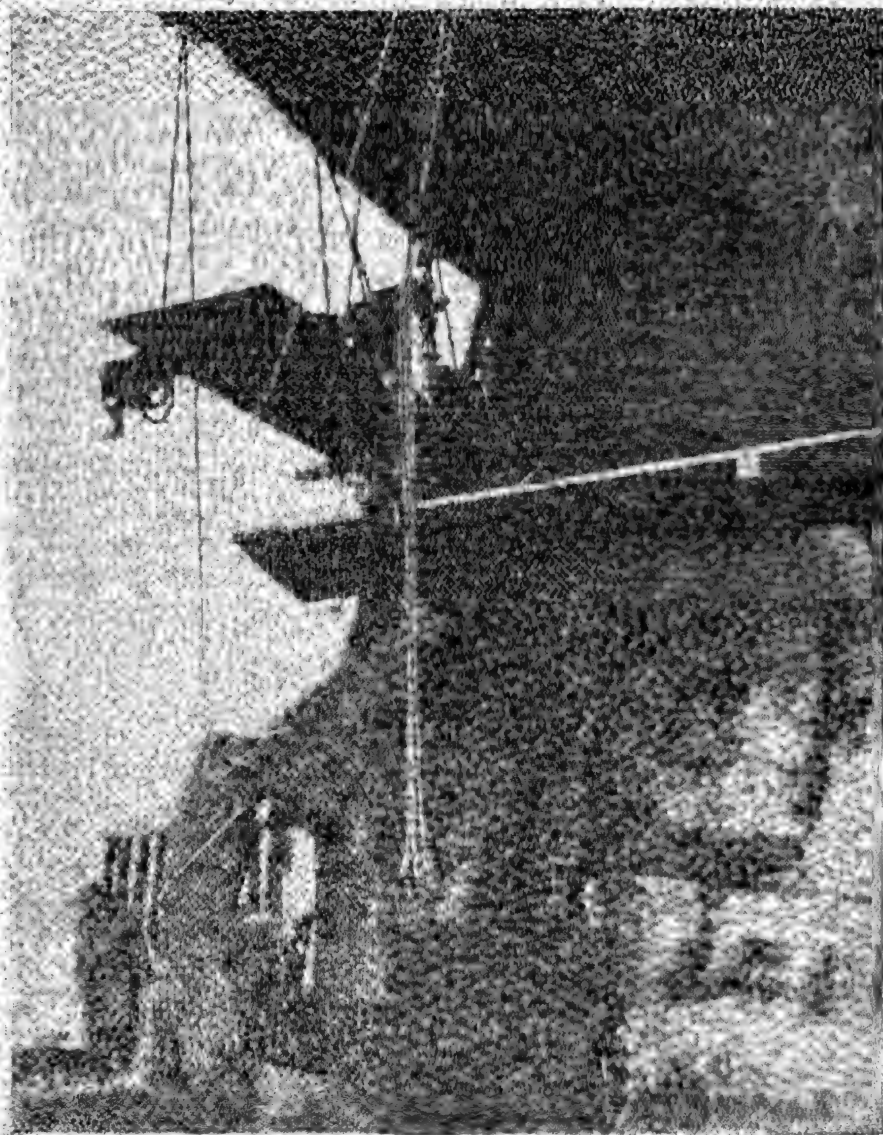
CARDBOARD TUBE.—Binoculars are scarce. A cardboard tube, 2 feet long, 1½ inches in diameter, and painted black inside, can be used to narrow the field of vision and reduce eye strain.

VENTILATORS.—Be sure that you know where the ventilators lead. Then if a light shows through a ventilator cowl, you will be able to go to the source of the light and put it out.

DARKNESS.—Your ship is more likely to be attacked at night than during the day. Many ships have been torpedoed on moonless nights.

FOG.—At night in a fog or rain squall, it is vital that you know the location of every ship

near you. If you stare long in one direction, eye strain is apt to make it seem that you see a light that actually is not there. To avoid this, shift



No mine or torpedo blasted the hole in the bow of this merchant ship. She was crippled in the North Atlantic by an ordinary hazard of the sea—an ice floe. (Official U. S. Navy photograph—*Acme*)

your gaze frequently. Check up often with the watch officer, captain, and other lookouts.

SURFACED U-BOATS.—During fog or rain squalls keep a sharp lookout for surfaced U-boats.

ATTACK DURING STORM.—Submarines have inflicted heavy losses during storms. Wolf packs have often attacked while a storm was at its height. Captain S. C. Krolikowski, whose freighter was torpedoed, said that his ship was riding mountainous seas when the submarines were sighted.

George Burmester, a seaman, reported that the U-boats attacked while his ship was bucking terrific headwinds. "We couldn't run for it. We got our orders from the commodore to keep positions, so we headed into it. We took green water over the bow by the ton and we made a lot of progress up and down, but not much mileage. We were a set-up for the U-boats and they tore into us."

SMOKE.—Report smoke immediately. Smoke can be seen as far as 40 miles.

CIGARETTE GLOW.—On a clear night the glow of a cigarette can be seen for a half mile.

PERISCOPE.—If you sight what seems to be a periscope, make your report without taking your eyes from the object. A slight shift of your gaze may cause you to lose sight of it.

TORPEDO WAKE.—Depending on the speed and depth of the torpedo, its bubbly wake may be 100 yards or more behind the torpedo itself.

CAMOUFLAGED MINES.—Report every box, bit of wreckage, and piece of floating debris that you see. They may be camouflaged mines.

CROW'S NEST.—Sigman Stanisky, veteran of several shipwrecks, advised: "A rope or cable should be suspended from the crow's nest to provide the lookout a safe means of reaching the deck if the torpedoed ship takes a heavy list."

GLOVES.—Always take a pair of gloves with you to the crow's nest. Otherwise, your hands are sure to be burned or ripped if you have to come down a rope or wire cable in a hurry.

OFF WATCH.—While you are chatting or relaxing on deck, keep a sharp lookout. The more fresh, alert eyes a ship has, the more chance it will have of coming through. Many a torpedo, sighted in time, has been dodged. While chatting, face opposite to your shipmate, so that the two of you can keep watch on both sides.

BOW LOOKOUT.—Stephen Skwarko, seaman from a tanker struck by four torpedoes, advised: "The bow lookout should be transferred to the bridge when the tanker is loaded. Usually men on the bow lookout have very little chance of getting through to a lifeboat."

21. Engine Room

Most of the ships torpedoed in the engine room were traveling alone. Therefore, the U-boat commanders were able to make accurate calculations at close range. But with destroyer escorts and aerial patrols keeping submarines at a distance, a torpedo is no more likely to hit the engine room than another part of the ship.

Even when many ships were being torpedoed in the engine room, the casualties down below averaged less than 3 % of a torpedoed ship's crew.

GAS MASK.—If you work below, or have quarters in the vicinity of the engine room, keep your gas mask with you at all times.

Joseph Pazitka, fireman on a torpedoed troopship, reported: "The ship was hit in the engine room. The refrigerating system was damaged. Many men were overcome by ammonia fumes and were not able to help themselves."

ESCAPE LADDER.—Be sure that all escape ladders are slack. Ladders hauled taut are apt to be snapped by concussion.

ENGINE-ROOM CABLE.—Stout, elderly or injured men cannot climb the engine room's loose emergency chain ladder. Therefore, lead a wire

cable from the emergency exit on the boat deck to the engine room, with a bosun's chair attached. Then if the main ladders are blown away, an incapacitated man can still be hauled to safety.

SCREENS.—If emergency ladders lead to the fireroom ventilators, be sure that the screens in the ventilator cowls are removable from the inside. Screens over engine-room skylights, to which emergency ladders lead, must also be easy to remove from the inside.

SHAFT ALLEY.—Should steam cut off your escape by either the fixed or emergency ladders, make your exit through the shaft alley.

REVERSING ENGINES.—If possible after an attack, the engines should be reversed long enough to reduce headway.

Victor A. Hagstrom, master of a torpedoed ship, said: "I had standing orders for the engineer on duty to reverse the engines for a few moments, then to stop the ship, in the event of a torpedoing."

This was done, and despite three torpedoes, only one man in a crew of 49 was lost.

FUEL OIL.—Before abandoning ship, cut off the fuel oil supply to the boilers. Then if you can reboard the ship, it may be possible to raise steam again.

REMOTE CONTROL.—All merchant ships must be equipped with remote controls so that the

engines and circulating pumps can be shut down from the upper deck.

Angel Silver, oiler from a torpedoed freighter, reported: "When the ship was torpedoed, the engine-room gang waited to receive word from the bridge to abandon ship. After waiting for several minutes, they cut the engines and came up on deck. Either the officers did not notify them, or connections between the engine room and the bridge were cut."

Joseph Stumpf, fireman from a torpedoed ship, reported that after the first torpedo struck the bow, the captain kept the ship going, although it could make no more than three knots. Four hours later, two torpedoes hit the engine room and killed three men.

PORTABLE LOUDSPEAKER.—After an attack an engineer should be stationed at the engine-room skylight with a portable loudspeaker, to transmit orders from the bridge to the men below.

NOISE.—Avoid all unnecessary noise. Do not use a large gong for striking bells in the engine room. Remember that the popping off of safety valves can be heard a considerable distance.

TRIM.—James W. Seilhan, wiper on the *Gulf-belle*, explained how the tanker, though hit in the engine room, was saved. "Chief Mate Brewster went into the pumproom, gravitated the water forward, and raised the stern."

22. Tanker Safety

The one way to minimize panic on a torpedoed tanker is to have every member of the crew well informed beforehand regarding burning oil and the cause of explosions.

EXPLOSIONS.—If your loaded tanker is torpedoed, tank explosions should not be your immediate concern. Since burning oil causes these explosions, and not the torpedo blast, there will be time to abandon ship before any occur.

BALLASTED TANKER.—No gas explosion on a ballasted tanker, even though not gasfree, has been reported.

MANHOLE COVERS.—Keep all manhole covers tightly dogged. Air in a damaged compartment will then be trapped there, and will delay the flooding of the compartment.

WETTING DOWN.—After sundown all open decks should be drenched. Saturate with water everything that can soak up oil.

FIREROOM VENTILATORS.—Because of the danger of oil from the torpedo blast flooding into the fireroom, the ventilators should be trimmed as nearly aft as the temperature below will permit.

UNBALLASTED TANKS.—Run about two feet

of water into each unballasted tank. If the tank is hit, spray caused by the torpedo blast will reduce the power of exploding gases by lowering their temperature. The water, thrown against oil-covered bulkheads, will help to prevent fire.

PUMPMAN.—At sea the pumpman should be on night work, prepared to jettison cargo the instant it is necessary.

DISPLACEMENT.—When a tank loaded with crude oil is struck, the oil is rapidly displaced by sea water. Therefore, if the tanker is going ahead, it will soon be out of the oil area.

Instead of increasing the hazards by immediately launching boats into the oil slick, all effort should be devoted to clearing the decks of burning oil, which can cause other tanks to burst.

WASHING DOWN.—After a tanker is hit, every hose should be used to wash overboard any oil on deck. When the bridge officer has made the torpedoed side the lee, wash down from the windward side.

Heat from burning oil will open vent valves. More oil, raised by water displacement, will feed the flames through these valves. Eventually the heat will burst other tanks and sink the ship.

BURNING TANK.—If a burst tank is afire, turn all the streams on it. The water will lower the temperature, help to keep adjacent tanks from bursting.

STEAM.—Turn steam, either from the smothering line or a hose, into a burning tank. Hold in the steam by covering the hole with a water-soaked tarpaulin.

CARGO PUMPS.—When a burning tank has no outlet to the sea, pump it full of water. The flaming oil will flood onto the deck where it can be washed overboard.

JETTISONING.—If possible, wait until the fires are out before jettisoning cargo. Do not jettison unless the ship is going ahead. Discharge the oil through the sea chest on the torpedoed side.

EXPLOSIVE POINT.—Oil or gasoline vapors can explode only when the concentration in the air is from 1% to 6%. Below 1% the concentration is too thin to cause an explosion. Above 6% the concentration is too heavy.

GASFREEING TANKS.—Under wartime conditions it is inadvisable to attempt to gasfree a tank. During the process of gasfreeing, the concentration of gas will be reduced until it reaches the explosive point from 1% to 6%. At sea the law requires that the hatches be kept closed. Without ventilation the vaporization of the gasoline or oil saturating the scale on the sides of the tank very likely will again produce the 1% to 6% explosive gas concentration.

23. Tropics

With a little understanding of what to do, you can fare very well as a castaway in the tropics—if you are able to keep clear of the Japs.

ENEMY GUNFIRE.—Particularly against the Japs protect yourself at all times. Chief Boatswain's Mate Vernon A. Suydam reported: "A Jap cruiser headed straight for where half a dozen of us were struggling in the water. It opened fire with machine guns. When the firing stopped four of my companions were dead."

GRAB-LINE LANYARDS.—Chester Just, A. B. from the shelled *Ex-Moor*, suggested: "Lanyards of twelve-thread should be spliced on the bights of your lifeboat's grab-lines. The lanyards should be about 8 feet long. Then if machine guns are fired in your direction, you can dive overboard and stay under, still holding contact with your lifeboat by clinging to the line."

SHARKS.—Sharks are cowards and can be scattered by splashing and shouting. They will flee from an attack, so face them and do not swim away.

A shark's nose and gills are his tender spots. In a lifeboat you can send a shark on its way by striking it on the nose with an oar.

One species of South Seas shark is dangerous. It is about 8 or 10 feet long, with a thick body, blue back and a blue dorsal fin. This shark is a man-killer.

BARRACUDA.—A barracuda leaped out of the water and took a leg off a man climbing a Jacob's ladder. A barracuda has never been known to strike more than once, but it leaves a wound so grievous that the victim is almost certain to die of shock. Your best protection against the fearless, merciless, inquisitive barracuda is sufficient seamanship to enable you to launch a lifeboat safely.

BIRDS.—In the South Seas you will sight birds 700 miles from land.

The red-footed booby flies no more than 100 miles out, while the brown booby limits its sea flight to 30 miles. Toward evening, boobies head for land, and it is advisable to set your course in the general direction of their flight.

FISHING.—Fish are more apt to bite at a moving bait.

Be sure your hook is free of seaweed, or the fish are not likely to bite at it.

Keep a lookout for schools of fish, which can be seen breaking water.

If you have fish to spare, try chumming. Cut the fish very fine, and scatter the pieces over the water. The boat should either be stopped or mov-

ing very slowly. Chumming will attract birds as well as more fish.

William Thompson, oiler from a torpedoed American freighter, used an oar to stun fish nibbling at seaweed.

BARNACLES.—The survivors of the *Donerail* found a floating pole covered with barnacles and small shellfish. They picked it clean.

INGENUITY.—Even if you are on a raft and have no supplies or equipment, you should be able to survive in the tropics.

Nichie Hoogendam and Cornelius Vanderslot, who spent 83 days on a raft, caught fish with their bare hands. Each of them also caught a baby shark. They also snared fish with a noose made from a line, dangling their toes over the side for bait.

Poom Lim, a steward from a torpedoed British freighter, pulled a nail from his raft, made a hook, and attached the spiral spring from a flashlight for a line. He caught fish, spent 133 days—alone and completely naked—on the raft.

POISONOUS FISH.—Any South Seas fish you catch inside a reef may be poisonous. If there are no natives around to tell you which ones are edible, eat a tiny piece of fish. If your stomach suffers no ill reaction, you can try another tiny bit.

Do not experiment with the parrot fish, which

is brightly colored and has beak-like jaws; or the puffer fish and porcupine fish, which swell up when touched on the belly. They are poisonous.

Fresh-water fish, crabs, shrimps, snails, and crawfish, must be cooked in boiling water to make them safe eating.

CORAL REEFS.—On coral reefs fresh water can usually be obtained by digging a hole less than a foot deep. Brackish but drinkable water will soon seep into the hole. If you dig deeper, you are liable to reach salt water.

Farther from the beach it may be necessary to dig down from 3 to 5 feet.

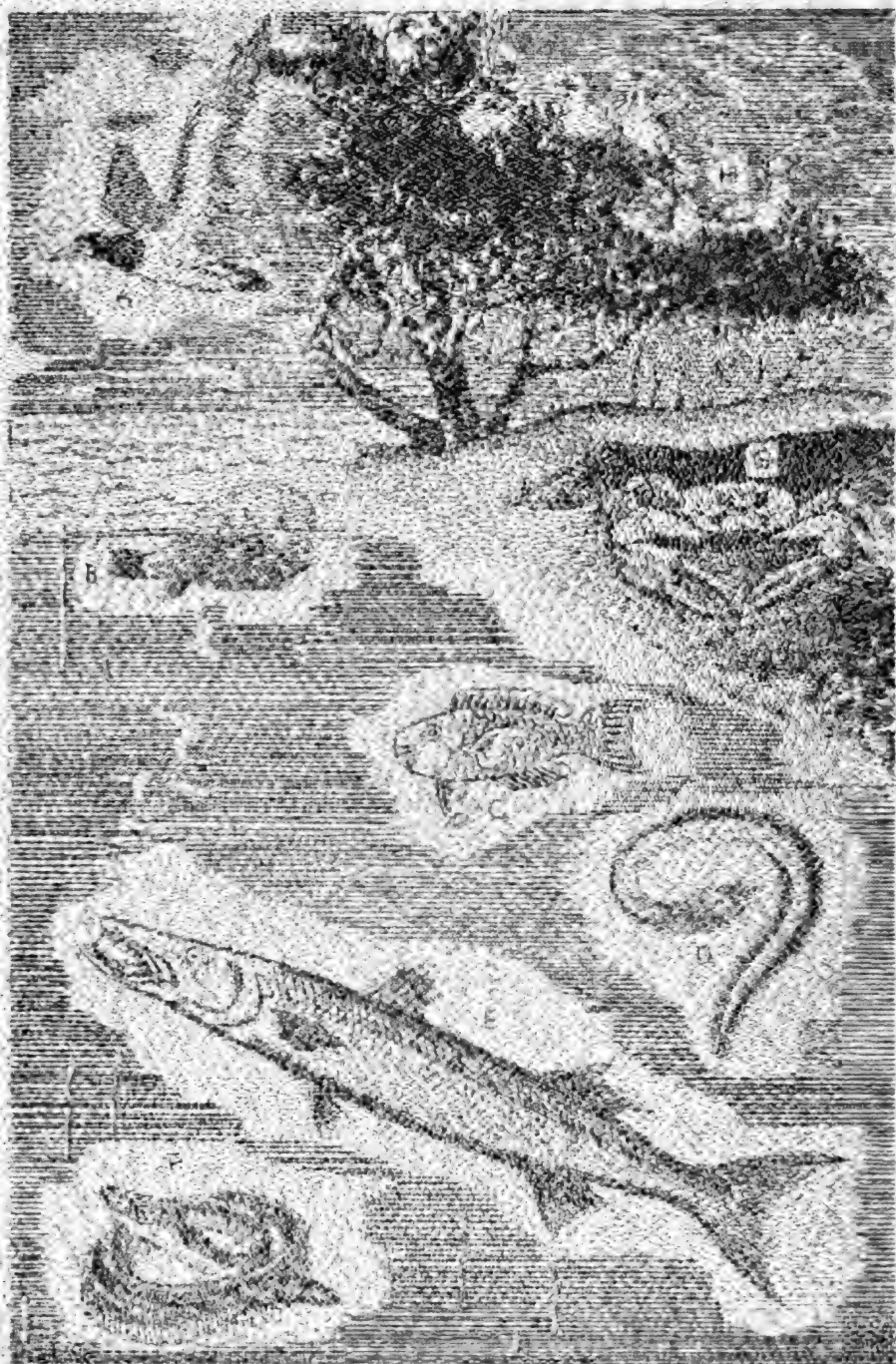
Whenever possible, water obtained in the tropics should be boiled before drinking.

WATER.—Drinkable water may be obtained by cutting the trunk of a palm, the stem of a rattan, or the stalk of a bamboo.

COCONUTS.—Coconuts are the source of water. The milk of young coconuts is bitter, but it is better for you than the more palatable juice of old coconuts, which will act as a physic.

SPROUTS.—The sprouts on a coconut picked up off the ground are edible, also the spongy substance in the cavity. Bamboo sprouts provide good food, either raw or cooked.

PLANT BUDS.—The buds on top of many palm trees and rattans make delicious salad. Rattans are slender vines with sharp thorns.



A. Brown booby, slight range, 30 miles at sea, B. Blow fish, poisonous, C. Parrot fish, brightly colored, poisonous, D. Eel, edible, E. Barracuda, vicious, will attack man, F. Sea snake (noye scales), poisonous, G. Land crab, ugly but good food, H. Red-footed boobies, slight range, 100 miles at sea.

COCONUT OIL.—William Scott, messman from a torpedoed freighter, punched holes in a tin plate, which he used to scrape oil out of coconuts. He boiled the oil until it was thick, and used it to fry shark meat.

The oil can be used as fuel for lanterns.

LAND CRABS.—Feed coconuts to land crabs to fatten them.

TURTLES.—Turtle meat is excellent food. Also the juice will serve to quench your thirst. The eggs, buried ashore, are good cooked or raw. The heat of the sun will produce a palatable oil from turtle fat, which you can use to flavor your food.

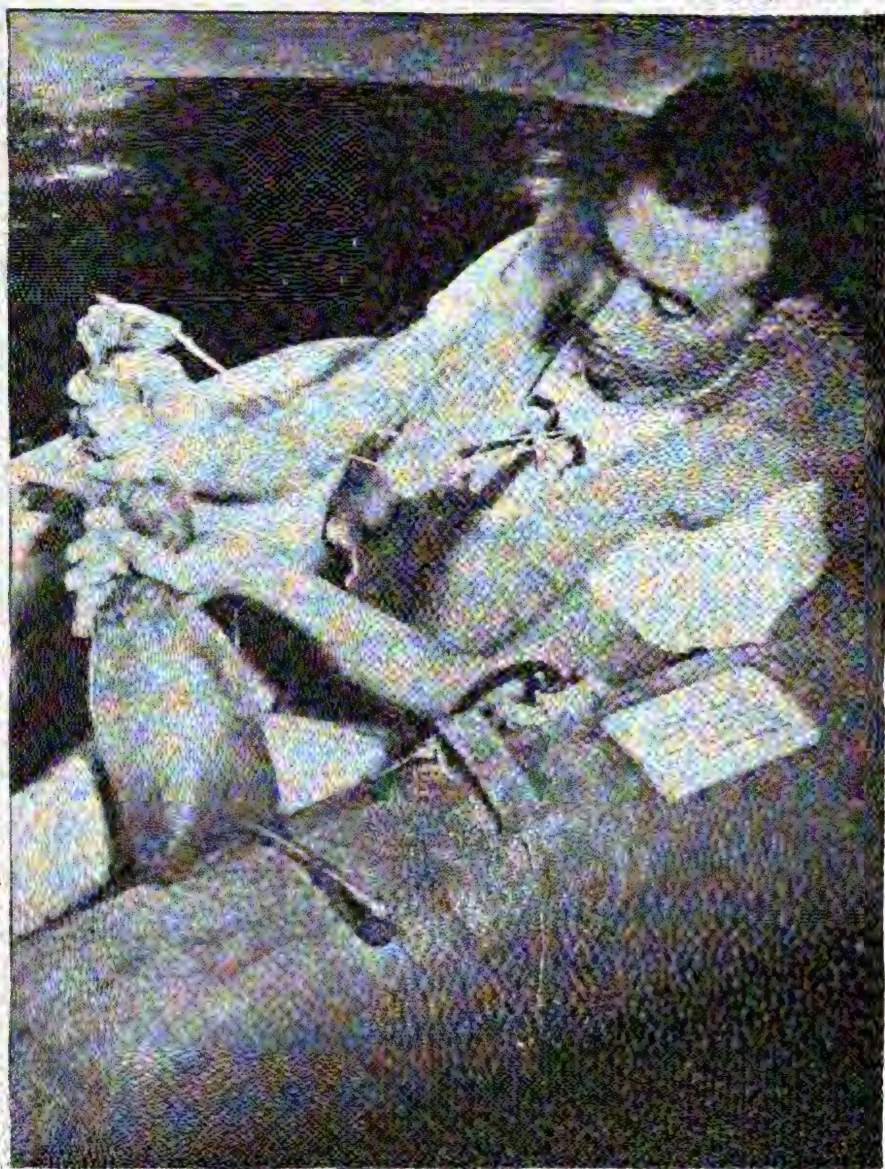
A harpoon must be struck hard to pierce a turtle's shell. In the water you can turn a turtle on its back and tow it to your boat.

SQUID.—Raw squid is tough though edible. To make the squid tender, dry it in the sun.

SHARKS.—Shark meat is very salty and should not be eaten unless plenty of drinking water is available.

MONKEYS.—You can eat anything a monkey will eat.

TROPIC FOOD.—Monkeys, bats, lizards, frogs, snakes, and grubs taken from the ground or rotten wood are edible. Toast grasshoppers on a stick, but avoid caterpillars, which are poisonous.



A method of making sea water drinkable is demonstrated by Joseph N. Shaner, Pharmacist's Mate 2nd Class. By squeezing the upper portion of a plastic bag, he is forcing chemically treated sea water through a filter sack. This process removes the chlorides (salt) from the water. (Official U. S. Navy photograph—*Acme*)

24. Devices and Equipment

Since the winter of 1942, when hundreds of unprepared seamen were killed, tremendous improvements have been made in devices and equipment for safety at sea. For anyone who escapes a direct hit, the odds are now almost 100% in his favor for survival, provided he has trained himself to make use of these improvements.

GOETZ WATER BAG.—Dr. Alexander Goetz of the California Institute of Technology has perfected a chemical for removing the salts from sea water. Salt water in a plastic container is treated with the chemical, which separates the salts from the water. It is then poured into a second container, where it is cleared for drinking. The process, requiring about 2 hours, is simple enough for any one to operate.

FREEZING.—A machine has been invented in Canada which produces drinkable water from sea water by a freezing process. This device also can be operated by anyone.

STILL.—A 7-pound still for use in lifeboats

and rafts has been invented. It will produce 12 pounds of drinking water from sea water for every pound of fuel consumed.

DISTILLING WATER.—If you have no other means of obtaining drinking water, remove an end from an air tank. Put the tank in a vertical position with the closed end submerged in a foot or two of salt water. Place a lighted lantern inside the tank. Cover the top of the tank, allowing sufficient air to keep the lantern burning. The heat will cause sweat to collect on the inside of the tank. Soak up this sweat with a clean rag and squeeze it into a cup. It is drinkable water.

SAFETY IN THE WATER

JUMPING.—If it is necessary for you to jump, you should jump feet first, with feet crossed and arms protecting your face. Crossed feet will splash a path through water that may be covered with flaming oil, and your arms around your face will protect your head from hitting debris.

Never take the risk of being picked up between the lifeboat and the ship's side. Should you find yourself in this position, dive under the lifeboat.

OIL SLICK.—Swimming through burning oil or gasoline is now a part of the training routine in the Armed Forces. The procedure is simple.

Use the breast stroke, splashing the flames away at the beginning of each stroke. Do it calmly, rhythmically. Frantic, frenzied splashing is not necessary. Swim to windward.

If the oil is thick, swim under water. When your lungs can no longer stand the strain, shoot up with all your power, swishing the water outward with your hands. Keep the eyes and mouth closed when coming through the oil surface, and exhale through the nose. Keep splashing until you take a breath and go under again.

KEEPING AFLOAT.—If you have to go into the water without a life jacket, take off your dungarees or trousers, tie the legs, hold the trousers overhead by the waist, and jump. In the water the trapped air will inflate the trousers, provide adequate buoyancy to keep you afloat. A pillow slip, cotton shirt, or a sea bag also can be easily inflated.

LIFE-PRESERVER LIGHT.—Attach your light near the top of your preserver to obtain as much visibility as possible.

A white light in the water indicates a raft or float.

A red light—the color of your life-preserver light—indicates a man.

LIFE BUOY.—In a lifeboat, if you cannot reach a man in the water, secure a line to a life preserver and throw the preserver toward him.

MOTOR LIFEBOAT.—Near shore in a heavy sea a motor lifeboat can be a death-trap. If the motor dies, the boat is very apt to broach to, and capsize. Should your ship be wrecked on a reef, do not disembark in a motor lifeboat unless it is the last resort. Be sure that the boat is adequately supplied with oars lashed down.



A heavy Pacific coast storm wrecked this Russian freighter, not an Axis torpedo. (Anon.)

Consider your chances of swimming back to the ship, in case the boat capsizes.

Be sure that the route of the motor lifeboat will be far enough from the rocks so that if the boat capsizes, there will be time to right it before you and your shipmates are carried into the rocks.

A lifeline should be fired by the Lyle gun or a rocket to reach shore or outlying rocks.

Thirteen crewmen on the *Lancaster*, wrecked on a reef near Casablanca, disembarked in a motor whaleboat manned by a rescue party of four. Despite 20-foot seas, no one apparently had any more thought of disaster than a man has in crossing the street. One seaman even neglected to wear a life jacket.

The boat swamped. One man swam back to the *Lancaster*. Sixteen of them clung to the grab rails, were swept into the rocks and killed.

SIGNALING

PORTABLE RADIO.—Stow the portable radio on the bridge, not in a lifeboat. More than one man should be assigned to take it to the lifeboat in an emergency. Do not use the radio until you are reasonably sure that the submarine has left your vicinity.

SIGNAL FLAG.—To be seen from a plane, the yellow or orange signal flag should be held taut

by two men. Hold it in an up-and-down position, and then turn it so it is held flat. This movement will cause the color to flash, and will increase the possibility of it being seen.

FLUORESCENT CLOTH.—Arc yellow and neon red fluorescent cloth, used by the armed forces, can be seen at 10,000 feet. This cloth is available for merchant ships.

SMOKE SIGNALS.—To use a smoke signal, throw it to leeward. To make a dense smoke, smother a fire in a bucket with partly dried seaweed.

PARACHUTE FLARE.—A parachute flare can be used effectively to draw attention even in bright sunlight.

WARTIME LIFEBOAT EQUIPMENT

Bailer.—1 bailer, lanyard attached.

Bilge Pump.—1 bilge pump.

Blankets.—6 blankets, or more, in waterproof covers.

Boathooks.—2 boathooks.

Bucket.—1 galvanized iron bucket, lanyard attached.

Canvas hood and side spray curtain.—1 canvas hood and side spray curtain.

Chart, pilot.—1 current Hydrographic Office pilot chart of the waters navigated, in a metal container.

Compass.—1 liquid compass.

Daytime distress signals.—4 smoke signals.

DEVICES AND EQUIPMENT 171

Distress lights.—12 self-igniting red distress lights in a watertight metal case.

Ditty bag.—1 canvas ditty bag containing sail-maker's palm, needles, sail twine, marline, marline-spike.

Drinking cups.—3 drinking cups, 2 of them the well-bucket type, chain or lanyard attached.

Drinking water.—10 quarts per person, in 4 containers, which have no valves, cocks, spigots.

First-aid kit.—1 first-aid kit in a watertight container:

2 units, 1-inch adhesive compress, each containing 16 compresses.

1 unit, ammonia inhalant, 4 tubes, each 2 cc. per tube, and 4 drinking cups.

1 scissors, blunt.

1 unit, gauze compress, 24 x 72 inches.

2 units, 3 ounces tannic acid jelly in not less than 2 tubes. (10% tannic acid with 5% sulfadiazine.)

1 unit, 3 eye pads, adhesive strips, 3 tubes eye dressing not less than $\frac{1}{8}$ ounce each.

1 unit, 3 vials of iodine 10 cc. each.

1 unit, 4-inch bandage compress.

2 units, 4 each, 2-inch bandage compress.

1 unit, triangular bandage, 40-inch.

1 unit, gauze bandage, 4 inches by 6 yards.

2 units, containing tourniquet and forceps.

1 unit, splint-wire, or equivalent.

1 dozen safety pins.

Fishing kit.—1 fishing kit with instructions.

Flashlight.—1 flashlight in a portable, watertight

172 HOW TO ABANDON SHIP

metal case. 1 extra lamp, 3 extra 3-cell flashlight batteries.

Grab rails.—2 grab rails.

Hatchets.—2 single-edged hatchets, lanyards attached.

Illuminating oil.—1 gallon illuminating oil in metal container.

Lantern.—1 lantern containing oil to burn 9 hours. 2 additional lamp wicks in waterproof container.

Lifeline.—1 lifeline the entire length on each side, made fast in bights, seine float in each bight.

Life Preservers.—2 life preservers.

Locker.—1 locker or box for the storage of small items.

Manila line.—30 fathoms of 15-thread manila or sisal.

Mast and sails.—1 mast or more. At least 1 good mainsail and 1 jib, with proper gear. Sails either red or chrome yellow.

Matches.—3 boxes of friction matches in water-tight containers.

Oars.—A single-banked complement of oars, 2 spare oars, 1 steering oar with rowlock or becket. Motor lifeboats and lifeboats with hand-operated propellers must have 4 oars, 1 steering oar.

Painters.—2 painters.

Plugs.—1 automatic plug for each metallic lifeboat. Wooden lifeboats without automatic drain holes must have 2 plugs, attached to boat with chains, for each drain hole.

Propellers, hand-operated.—All lifeboats, except motor boats, capacity 60 persons or more, must have a hand-operated propeller.

Provisions.—The following provisions for each person the boat is certified to carry:

14 ounces of biscuits, Type C ration.

14 ounces pemmican.

14 ounces chocolate tablets, or additional 14 oz. Type C. ration.

14 ounces milk tablets.

Rowlocks.—1 set and $\frac{1}{2}$ of thole pins or rowlocks attached to lifeboat by separate chains.

Rudder and tiller.—1 rudder and 1 tiller.

Sea anchor.—1 sea anchor.

Signal flag.—1 yellow or bright orange bunting flag.

Signaling mirrors.—2 polished metal mirrors.

Signal pistol.—1 signal pistol, lanyard attached. 12 red lights.

Storm oil.—1 gallon vegetable or animal oil in a container.

Wooden bullet-hole plugs.—25 or more softwood plugs in canvas bag.

Abandon-ship kit.—At least 2 to a ship. Each kit must contain:

20 $\frac{1}{4}$ -grain syrettes of morphine.

48 $\frac{1}{2}$ -gram sulfadiazine tablets.

10 watertight packages, $2\frac{1}{2}$ grams sulfanilamide powder.

4 ounces of oil-cleansing solution.

5 4-ounce tubes 5% sulfadiazine-tannic acid 10% jelly.

2 chemical heating pads.

STOWAGE.—Richard Berger, second officer of the torpedoed *Esparta*, advised: "Locate as much as possible of the boat gear in the forward part of the boat, leaving the stern sheets free for men and passengers."

Canvas bags are not sufficient protection for blankets. The six blankets should be stowed in watertight packages of two.

RATIONS.—Your lifeboat has been provided with 56 ounces of food for each person—a 10-day supply when divided into 10 daily rations of 5.6 ounces. The amount in each daily ration—800 calories—will sustain life. To aid you in calculating your rations, 1 biscuit, 19 milk tablets, and $\frac{1}{4}$ can of pemmican each weigh approximately an ounce.

25. Facts and Figures

Despite the hazards, a surprising number of men have survived many torpedoings with no permanent ill effects. Captain Byron Miller and L. Leslie Pilbean each have been torpedoed six times.

In less than one year Robert Adley was torpedoed seven times. He was first torpedoed on the *Pan-Massachusetts*, March, 1942, off Miami. A short time later he was torpedoed off Key West. Then off the Norwegian Straits, off New Jersey, off Cape Cod Canal, off Karachi, India, off Halifax.

HEADWAY.—When the engines are shut down or put out of commission by a torpedo, it will take 8 to 15 minutes for the ship to lose headway.

TORPEDO BLAST.—Many seamen have been hit by the pressure wave of a torpedo blast without being injured. After he was blown into the water, Nichie Hoogendam, 17, swam without a life preserver for 9 hours before he found a raft. Poom Lim swam for an hour and a half after a torpedo explosion hurled him into the water.



A stick of bombs from a Nazi plane explodes near a British destroyer. This picture of bombs missing their target has been duplicated countless times at sea. During a single day, early in the War, more than 2,000 Axis bombs were dropped around the British battleship *Malaya*, without one direct hit being scored.

(Acme)

Said James Wynne, A. B.: "I had just managed to get to the foot of the ladder leading to the bridge. Then I was on the bridge on my hands and knees. I was blown right up there."

BOMBS.—The blast pressure of a medium-sized bomb has a short range. A person caught within a 30-foot radius will be blown to pieces. Outside this area the blast itself may do no more than knock him over.

The chief danger lies in the thousands of steel fragments thrown from a bursting bomb casing. These fragments travel as far as a mile, but air resistance quickly reduces their speed. Beyond 200 to 400 feet, depending on the bomb's size, the fragments are not likely to be effective.

DEPTH CHARGE.—A depth charge exploding at a distance of 30 feet or more from a merchant ship's side can push in its hull plates. That is because the incompressible water transmits the force of the explosion. Displaced by the huge globule of gas formed when the charge is detonated, the water is driven like a gigantic hammer against anything in its way.

Therefore a person swimming in the water must be a considerable distance from an exploding depth charge to be out of the radius of the dangerous pressure wave.

However, any sort of an explosion is liable to give a freak performance. Men have been blown out of the water by depth charges without suffering grave injuries.

REBOARDING.—After abandoning ship, it is extremely hazardous to reboard unless you have reason to believe the submarine has departed. Many U-boats remain in the vicinity of a crippled ship until it sinks, or the commander decides to fire another torpedo.

An hour after his ship was bombed, John Pat-

rick Ogburn reported, the crew was about to re-board the ship when two torpedoes struck, and the vessel sank in three minutes.

Albert McGee Payne, A. B., reported that two hours after abandoning, the crew returned to the ship. A second torpedo hit #3 hold, a lifeboat was capsized, and one man was killed.

CAPTAINS TAKEN PRISONERS.—Never identify the captain to a submarine commander. In a period of 4 months, 14 ship captains were definitely known to have been taken prisoners aboard Nazi U-boats.

Captain Axel Broner, master of a torpedoed Panamanian freighter, said: "The first thing I thought when I saw the sub coming was all those reports about merchant captains being taken prisoner. I was lying on the bottom of the boat when the sub reached us, and when the commander asked who was in the bottom of the boat, the crew told him I was an injured seaman."

GERMAN ACCENT.—Any American seaman with a German accent should follow the example of H. Keith, a first assistant engineer. While the U-boat commander questioned his shipmates, Keith, who was born in Germany, kept silent. Had he talked, his accent probably would have caused the Nazi commander to take him a prisoner.

TIME ADRIFT.—When you start wondering if

you will ever see land again, remember that others have survived long periods in open boats.

Carol Shaw, 7, and three other children were among those on a raft which drifted for 21 days.

Sigfred K. Brunn, radio operator, and 7 shipmates from the torpedoed *Donerail*, spent 38 days in a lifeboat.

Seabury Cook, second mate, and 8 shipmates were in a lifeboat 39 days.

James A. Whyte, a British officer, and Mrs. Margaret Gordon survived 51 days in an open boat.

Basil Izzi, 20, and Nichie Hoogendam, 17, with Cornelius Vanderslot, drifted on a liferaft in the South Atlantic for 83 days.

Poom Lim, 25, was alone on a liferaft for 133 days.

WHERE HIT.—Out of 50 torpedoed freight ships, chosen at random, the following places were the first to be hit:

Bow	2
#1 Hatch	6
#2 Hatch	10
#3 Hatch	3
Engine Room	20
#4 Hatch	5
#5 Hatch	2
Stern	2

These figures indicate that living quarters in the bow and stern are desirable.

SECOND TORPEDO.—After the first torpedo hits, watch out for the second one. Many ships have been torpedoed twice, some three and four times. The following figures, concerning 10 ships which were hit twice, are given to emphasize the need for keeping a sharp lookout while preparing to abandon ship.

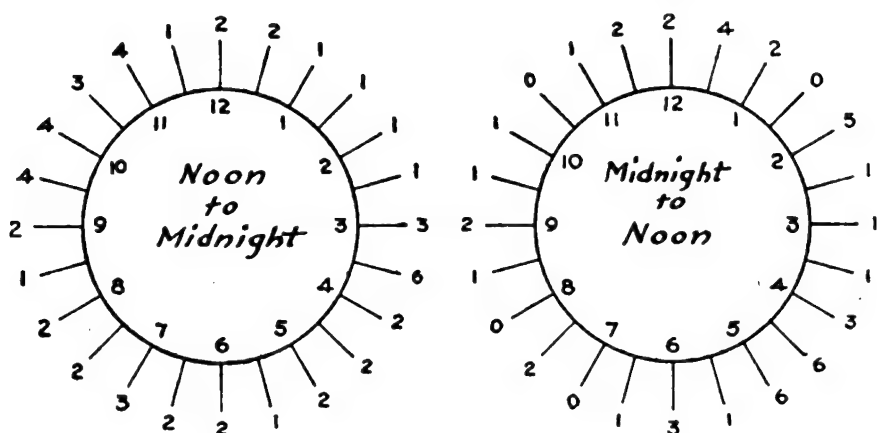
	<i>Time Between Hits</i>	<i>1st Hit</i>	<i>2nd Hit</i>
1.	20 minutes	#2 Hatch	#5 Hatch
2.	1 hour	#2 Hatch	#5 Hatch
3.	4 hours	Bow	Engine Room
4.	15 minutes	Eng. Rm. Stbd.	Engine Room port
5.	1 hour	Stern	Engine Room
6.	6 minutes	Engine Room	#1 Hatch
7.	15 minutes	Engine Room	#5 Hatch
8.	2 hours, 20 minutes	#2 Hatch	#3 Hatch
9.	3 seconds	Bow	Stern
10.	30 seconds	#1 Hatch	Engine Room

TIME GRAPH.—From the records of 100 torpedoed ships chosen at random, the time of torpedoing has been listed to the nearest half-hour. These are individual torpedoings. No two ships torpedoed in the same attack have been included. The figures outside the circles in the accompanying drawing indicate the number of ships out of 100 torpedoed at that hour.

While there are four half-hour periods with no attacks, the figures clearly show that there is

no time at sea when you can afford to relax your vigilance.

The pre-dawn period from 4:00 A. M. to 5:00 A. M. has the highest concentration of attacks. However, the most dangerous period is from 9:00 P. M. to 11:00 P. M.—with 17 torpedoings. During these hours card games are going on in the



Time graph of 100 individual torpedoings.

mess rooms, the gun crew and lookouts are apt to be indulging in a little hilarity over the phones, and there is a general feeling of security which is belied by the facts. Captains should hold frequent night drills between 9:00 P. M. and 11:00 P. M.

Noontime, while the men are at dinner, is also a danger hour, with 6 torpedoings out of the 100 listed. Coffee time for the day men, from 3:00 P. M. to 3:30 P. M., is another treacherous period, with 9 torpedoings.

ABSTRACT OF BANIGAN'S VOYAGE IN A ROBIN MOOR LIFEBOAT

May 21—No attempt to sail. Put out sea anchors, drifted, rested, kept clear of wreckage. Night, boats secured by painters. Mast stepped. Lantern set up. Men in #4, on tail end, rowed to keep other boats apart.

May 22—Old Man's orders to sail for St. Paul Rocks, light, unwatched. Sailed 0815 GMT. 14 mi. to noon. Mod. NE wind, sea and swell. Set watches, 3 on a watch. Instructed men how to steer. Lengthened stays with lifeline. Added canvas to get more sail area. Rations 3 times day: 1 biscuit, 1 cup water, $\frac{1}{2}$ small onion. Night, signaled to Old Man with flares.

May 23—71 mi. to noon. Rain squalls. Overcast. Knocked out end of air tank to catch rain water. Made tiller out of spreaders. Yoke with lanyards inefficient.

May 24—43 mi. to noon. Made new sea anchor. Night, permission from Old Man to go off alone. Taylor rowed off with his boat and disappeared over horizon. NE wind. Mod. NE sea and swell. Near southernmost limit NE trades. Realize cannot make St. Paul Rocks.

May 25—41 mi. to noon. Overcast, heavy rain squalls. Rough SE sea and mod. swell. Mod. SE wind.

May 26—67 mi. to noon. Overcast, heavy rain squalls. Mod. SE wind. Rough sea and heavy swell. Current setting to northwestward. Wind abeam. Afternoon, Hugh Murphy, messboy, at tiller, almost

ran aboard two whales. Night, heavy squalls. Blowing. All but three men on weather side. Last attempt to make south latitude. Flares seen from the other boats. Answered. Taylor's boat reappeared. Shipping water, bailing constantly. Cold. Rationed liquor.

May 27——64 mi. to noon. Rough and heavy sea. Almost got swamped. Told men could not make Rock. Current, wind, sea setting us off. Decided to run before it. Faces fell. Night, following sea, A. B.'s steering.

May 28——101 mi. to noon. Rough sea, heavy swell. Partly cloudy. Too far northward, tried to make southing. Men well, but wet, chilled.

May 29——67 mi. to noon. Rain squalls. Mod. SE wind. Heavy sea and swell.

May 30——30 mi. to noon. Overcast. Light var. airs. When sun came out, burned through clothes. Feet and legs swelled. Night, boat pounded.

May 31——No sight. Drifted. Overcast. Terrific burns. Water boiling with fish. Men restless.

June 1——36 mi. to noon. Overcast, rain squalls. Mod. SE swell. Light airs. Night, NW winds, died out in morning.

June 2——69 mi. to noon. Morning, smoke spotted. Saw ship for 5 hrs. About 7 mi. off, changing course. Rags burned, kerosene smudge, but smoke blended with clouds. Cook crying, panicking others. Men rowed. Let them row one hour. Night, no wind. Pounded.

June 3——No observation. Water alive with fish. Drifted. Heavy SE sea and swell. Heavy rain squalls.



These survivors of a British ship are pulling alongside a Coast Guard cutter. With rescue so near, there is still danger if the weight is not properly distributed. (*Adms*)

Light var. airs. Terrific pounding. Shivered all day and night. Lack of cigarettes felt.

June 4——79 mi. from noon of 2nd. Light var. winds to light airs. Overcast. Mod. swell. Heavy rain squalls.

June 5——17 mi. to noon. Overcast, cloudy. Heavy rain. Lt. airs, mod. SE swell. Night, crew getting leery.

June 6——27 mi. to noon. Cloudy, clear. Gentle to mod. SE wind. Mod. rough sea and swell.

June 7——52 mi. to noon. Gentle to mod. SE wind and mod. rough sea. Cloudy and clear.

June 8——73 mi. to noon. Mod. E'ly winds. Partly cloudy and clear. Rough sea and swell. 35 mi. from Great Circle track. Men excited. Watched steering. Sharp lookout. Night, moonlight. Sea became very rough. Decided to get nap and then stay up rest of night. 9:45, Peter Buss, A. B., reported light. Sent up flare. Got men on oil lamp. Men jumped on thwarts. Lifted center of gravity, almost capsized. Light over side of ship. Hove to. Came about, got alongside. Brazilian ship, *Osorio*. Got men aboard. Holes cut in tanks and bottom of lifeboat to sink it. Dist. 898 mi. Total time—18 days, 16 hrs., 49 mins.

Index

- Abandon-ship package, 23
Abdominal wounds, 87, 91
Abosso, 39
ADAMS, JOHN, 15
ADLEY, ROBERT, 175
Agar, 122
Airtanks, 50
Alarm system, 141
Albatross, 122
Alcohol
 burner, 27
 calories in, 118
 danger of drinking, 114
ALDRICH, GENE, 74
Alexandra Hoegh, 132
Allan Jackson, 3, 12
ANDERSON, 84
Anglo-Saxon, 50, 87, 112, 113
Antony, 38
Aragon, 69
Arcadian, 69
Arterial bleeding, 88
Artificial respiration, 96-7

BAKER, B. A., 16, 27, 59, 103, 120
BANIGAN, JOHN J., 6, 62, 182-85
Barfonn, 11
Barracuda, 159
BARROS, ANTONIO, 141
Beaufort scale, 125
Bedding, 104
BERGER, RICHARD, 174

Bienville, 147
Birds, how to catch, 122
Biscuits, moldy, 13
Blackout curtains
 care in using, 144
Blast injury, 99-100
Bleeding, 90
BLIGH, Captain, 104, 122
Blink, 4, 44
Blocks, 42
Blood, salt content of, 113
Boat cover, 34, 51, 54, 85
 caring for in cold weather, 136
Boat hook, 42, 53
BOCKHOFF, Capt. THEODORE, 30
Body heat, 111
Bombs, dropping
 blast pressure, 176-77
 precautions to take, 147
Brattice cloth, 22
Breakers, water, 113
BRINGEDAL, Capt. KNUT O., 32
Broken ankle, 89
Broken bones, treating, 92
Broken ribs, 89
BRONER, Capt. AXEL, 178
BRUNN, SIGFRED K., 179
Bullet-hole plugs, 27
Buoyancy, 9, 28
 delays sinking, 30
Burial at sea, 107

BURMESTER, GEORGE, 150
 Burns, 96
 first degree, 98
 third degree, 98
 treatment for, 100
 BUSS, PETER, 185

 Cable
 engine-room, 152-53
 CAIRNS, Capt. R. H., 111
California, 38
 Calories, 116
 in body fat, 118
 in different foods, 117
 in liquor, 118
 in watery foods, 117
 Canteen, 74
 Canvas preserver, 34
 Caps
 when not to wear, 145
 Cardboard tube
 substitute for binoculars,
 148
Cardonia, 75
 Caribou, 140
 CARINI, ALFRED, 79
 CARTWRIGHT, ERNEST, 18
Casper, 14
 CAVES, WILLIAM, 9, 38, 61, 79
Ceiba, 20
 Center of gravity, 42, 55
 CHADWICK, GUY F., 30
 Chafing pads, 36
 CHARETTE, WILFRED J., 147
China Arrow, 12, 31
 Chock, half, 37
 Chocks, 36
 CHRISTY, Capt. ROBERT E., 83
 Chronometer
 stowage of, 54
 Cigarettes, 86, 101
 glow of, 150
Ciltvaira, 31
City of Atlanta, 3
City of New York, 15, 80
City of New York lifeboat, 93,
 115

Clothing, 13, 24, 103
 cold-weather, 24, 134
 dead man's, 103
 Clouds, cumulus, 59
 Coast Guard signals, 59
 Cocoa, 118
 COHEN, Ensign NATHAN, 41
 Cold weather
 care of boat cover in, 136
 care of water breakers in,
 136
 clothing for, 134
 danger of unshaven beard in,
 134
 freezing food in, 138
 frostbite, 132
 life suit in, 132
 protection of hair, 134
 rationing energy foods in,
 118
 using coffee in, 135
 using grease against, 133
 using tobacco in, 134
 wool and fur in, 134
Collamer, 12, 21, 75
 Collision, 58
Comal Rico, 10
 Compass, 51, 57
 water in, 51
 Compass card, 142
 Compass rose, 63
 COOK, SEABURY, 179
 Cooking, fireless, 120, 122
 Coolness, 19
 Cork jacket, 9, 82, 83, 84
 dangers of, 13
 Cots
 where to place, 145
 Cross bows, 49
 Crow's nest
 hanging rope from, 151
 wearing gloves in, 151
 Cumulus cloud, 59
 Currents, 63

 Darkness
 attack in, 148

- DAVENPORT, Capt. THERON P.,
 24
 Davits
 gravity, 35
 quadrantal, 35
 radial, 35
 sprocket gears, 36
 Deck cargo, 39
 Depth bombs, 76, 177
 Destroyer
 danger of explosion, 76
 Dipping lug sail, 48
 Discipline, 48
 DIXON, HAROLD, 74, 76, 119
 DJOUKANOVITCH, General, 93
 Doldrums, 127
Donerail, 160, 179
 Downhaul, 49
 Dressing wounds, 91
 Drills
 abandon-ship, 10
 boat, 9, 17
 Drowning, 95
 Ducks, 61

E. H. Blum, 30
E. M. Clark, 10
E. W. Hutton, 14, 83, 84, 85
 Eels, 121
 EGENES, ARNE, 4
 Emergency provisions, 25
 Energy values, 116
 Equipment for safety
 fluorescent cloth, 170
 Goetz water bag, 165
 inspection of, 22
 life-preserver light, 166
 parachute flare, 170
 portable radio, 169
 signal flag, 169-70
 smoke signals, 170
 still, 165-66
 wartime lifeboat, 170-74
Erviken, 20
 Escapes, emergency, 21
Esparta, 174
Esso Bolivar, 32

Evros, 12
 Exhaustion, 72
Ex-Moor, 147, 158
 Exposure, 93
 Eyes
 treating for burns, 97

 Falls
 escape by, 42, 85
 paying out, 40
 Fatigue and frostbite, 133
 Fats
 cause less water loss, 114
 foods rich in, 118
 importance of eating, 139
 Feathering, 44
 Fender, 41
 FERGUSON, FRANK W., 10
 FERREIRA, ARMANDO, 93
 Fidley grating, 21
 Field ice
 drinking water from, 115
 Firearms, 46
 Fire extinguishers, 145
 Firing at sub, 46
 First-aid, 13
 First-aid kit, 88
 Fish, 119
 baiting, 159-60
 catching by mirror, 121
 catching by torch, 120
 cooking in lime juice, 120
 dried, 121
 flying, 120
 poisonous, 120, 160-61
 raw, 120
 tropical, 120
 Fish spear, 118
 FLAATHAN, Capt. CARL, 14
 Flames
 swimming in, 84
 wet towel protection, 83
 Flare pistol, 26
 Flares, 52
 parachute, 170
 Flashlight, 25, 86

- Fog
 lookout in, 148-49
- Following sea
 sailing in, 56
- Food
 barnacles, 160
 calories in different kinds, 117
 caribou, 140
 concentrated, 74
 double-duty, 112
 dried fish, 121
 dry, 111
 eels, 121
 energy values, 116
 extra, 25, 102
 frozen, 138
 inspection of, 49
 land crabs, 163
 method of dividing up, 105
 pemmican soup, 121
 Polar bear, 139
 rationing, 49
 rawhide, 121
 salmon, 121
 seal, 140
 sharks, 163
 squid, 163
 suet stew, 121-22
 survival time without, 116
 tropic, 163
 turtles, 163
 types rich in fat, 118
- Food versus thirst, 111
- Fractures, 92
- Frapping line, 39
- Frostbite
 contributing causes, 133
 degrees of, 133
 fatigue, 133
 moisture, 133
 perspiration, 133
 symptoms, 135
 treatment, 135
 wind, 133
- FUDSKE, HAWKINS, 18
- Fuel oil, 54
- Fuel oil (*Cont.*)
 coconut oil as, 163
- Gale, riding out, 58
- Galway Castle*, 69
- Gandia*, 4
- Gangrene, 87
- Garmoyle*, 39
- Gas mask
 in engine room, 152
- General cargo
 and buoyancy, 31
- Gilbert Islands, 120
- GIRARDEAU, Capt. FRANK C., 20
- GOETZ, Dr. ALEXANDER
 water bag, 165
- GORDON, Mrs. MARGARET, 179
- Grab lines, 54
- Grain cargo and buoyancy, 31
- Grease
 use against cold, 133
- Greenwich time, 26
- Gripes, 35
 inboard, 36, 37
 outboard, 34, 36, 37
- Gulf America*, 13, 30
- Gulfbelle*, 154
- Gulftrade*, 75, 77
- Gum, 111
- Gun crew, 77
- Gunshot wounds, 91
- Gunwale, 58
- HAGSTROM, VICTOR A., 153
- HAIR, V. B., 75
- HALLIBURTON, VINCENT, 20
- Halyard, 48
- Handy-billy, 37
- HANNEGAN, WILLIAM, 93
- Harry F. Sinclair, Jr.*, 9, 79, 80, 83, 84
- Haste, 44
 danger of, 18
- Hatch
 sleeping on, 145, 147
- Headway, 77

Heliograph, 61
HENNEVIG, Capt. T. R., 31
HOOGENDAM, NICHIE, 160,
175, 179
Hooks, pelican, 37
Horse latitudes, 127
Hunger, 116
Hysteria, 106

Ice, 4
Icebergs
 drinking water from, 115
Ila, 12
Immersion foot, 99
Independence Hall, 11
Injuries
 blast, 99-100
 lung, 100
 morphine injections, 100
 stomach, 100
Inspection of equipment, 12,
22
Irish moss, 122
Island
 finding by cumulus cloud, 59
IZZI, BASIL, 179

Jackknife, 25
Jacob Jones, 24, 76
Jacob's Ladder, 40
Jam, 25
JANSSEN, P. H., 46
Jellyfish, 120
JOHNSON, CHANDLER, 145
JOHNSON, JAMES, 77
Jupiter, 12
JUST, CHESTER, 158

KEITH, H., 178
KELLY, ROBERT EMMETT, 113,
120
KNERR, WILLIAM, 143
KROLIKOWSKI, Capt. S. C.

La Carrier, 111
LABARGE, ARTHUR, 17

Ladders
 engine-room, 21, 152
 metal, 41
Lagoon glare, 59
Lamp, lifeboat, 104
Lancaster, 148, 169
Landing, 60
LARSON, JOHN, 12
Latitude, scale of, 64
Laver, 122
Lead poisoning, 54
Leasowe Castle, 69
Leech, 48
Lemon rind, 111
Licenses, officers', 24
Life light, 23
Lifeline, 47
 lanyard, 41
Life preservers, 27, 44, 71
 how to don, 27
 lights on, 27, 167
 used as bedding, 104
Life suits, 4, 10, 22, 85, 132
Lifeboat
 artificial respiration in, 95
 bullet hole in, 46
 center of gravity, 16
 distribution of weight, 42
 falls, 85
 getting away from ship, 43
 grab-line lanyards, 158
 landing, 60
 launching from tanker, 85
 lowering, 38, 71
 motor, 168-69
 movement in, 58
 overturned, 47
 practice in handling, 16
 repairing hole, 47
 seaworthiness, 22
 swinging out, 34
 tanker, 79
 wartime equipment, 170-74
Lifejacket, 21
Lifelines, 51, 71, 80, 145
Liferafts, 73
 blankets for, 75

- Liferafts (*Cont.*)
 distribution of weight on, 75
 double trip release, 75
 keeping to lee of ship, 76
 knife needed on, 75
 lashings on, 77
 lubricant for, 75
 method of lowering, 71
 oarlocks for, 74
 propulsion of, 74
 riding, 77
 sea anchor for, 76
 trip release, 75
 wire rope lashing, 75
- Lights
 emergency, 144-45
- LIM, POOM, 160, 175, 179
- Lime juice
 cooking fish with, 120
- Liquor, 103
- List, 72
- LLOYD, BRYAN, 32
- Longitude, scale of, 64
- Lookout
 bow, 151
 off watch, 151
- Loudspeaker
 use after attack, 154
- Louvain*, 69
- Lowering with way on, 38
- Lubber's line, 51
- Lug sail, 56
 changing to sprit, 128
 speed with, 64
- Lumber, and buoyancy, 30
- Luminous tape
 where to place, 144
- Malay*, 4, 28
Malaya, 176
Maloja, 38
- Marine Inspection Service, 5
- Mason jar, 26
- Mast, lifeboat, 48, 53
- Mast step, screws of, 13
- McNULTY, Comdr. R. R., 41
- Meat, 138
- Medical supplies, 87, 100
- MELENDEZ, JOE, 10
- MILLER, Capt. BYRON, 175
- MILLS, F. J., 47
- Mines
 camouflaged, 151
- Money belt, for food, 74
- Monsoons, 127
- MOODY, THOMAS RYAN, 24
- Morale, 16, 101
- MORGAN, LESLIE, 113
- Morphine
 directions for giving, 100
- MUNDY (*Robin Moor*), 46
- MURPHY, HUGH, 182
- Naco*, 18
- Nature, 104
- Navigating, 62
 finding true course, 63
- NEHL, A. H., 141
- Night blinding, 123
- Noise
 avoiding, 154
- Nybolt*, 4
- Oar lashings, 42
- Oar, steering, 53
- Oarlock, 81
- Oars
 marking, 142-43
 stowage, 53
- Oarsmen, 43
- OGBURN, JOHN PATRICK, 177-78
- Oil
 burning, 47
 fuel, 54
 on decks, 144
- Oil slick, 81
 swimming in, 82, 166-67
- Oilskins, 25, 103
- Oneida*, 17
- Onions, 25, 49
- Ordinary seamen
 responsibility for, 16

- Osorio*, 7, 65, 185
Orranto, 68
 Overboard discharge, 81
 Pad-eyes
 painting, 144
 Painter, sea, 34, 36
 securing, 77
 strain on, 47
 use in boat, 42
 Panic, 5, 26, 46, 79
Pan-Massachusetts, 3, 79, 83, 175
 PANTALL, GEORGE, 24
 Papers, seamen's, 23
 PASTULA, ANTHONY J., 74
Patrick J. Hurley, 75
 PAYNE, ALBERT McGEE, 178
 PAZITKA, JOSEPH, 152
 PECK, ROBERT M., 132
 Pellagra, 122
 Pemmican soup, 121
 PEREIRA, Capt. W. L., 65
 Periscope
 sighting a, 150
Persia, 38
 PETERSON, CHARLES, 144
 PFISTERER, ALBERT, 13
 PHILLIPS, RICHARD, 105
 Picric acid gauze, 96
 PILBEAN, L. LESLIE, 82
 PILCHER, R. H., 87
 Pilot chart, 62, 70, 124
 compass rose on, 63
 wind roses on, 63
 Plug, 26, 34, 36
 bung, 142
 Polar bear, 139
 Pontoon rafts, 73
 Porthole, closing, 86
 Potatoes, 25, 49
 Preserver, cork, 13
President Lincoln, 68
 Propeller
 danger of suction, 44
 suction area, 73
 Protein poisoning, 139
 Provisions, emergency, 25, 27, 86; (*also see* Food)
Prusa, 13, 21, 26, 59, 103, 120
 Pumpman, 85, 156
 Radio shack, tanker, 86
 Rail, erecting in boat, 53
 Rain, how to collect, 77, 112
 Rainfall, 130
 Rainy seasons, 130
 RAMOS, ROSENDO, 25
 Rationing, 49
 effect on morale, 102
 of liquor, 103
 of water, 50
 Rations
 for water, size of, 113
 on liferafts, 74
 Rawhide, 121
 Recreation, 105
 Reef, when hoisting sail, 55
 Reefing, 57
 Releasing gear, 37, 40, 42, 142
 Remote control, 153-54
Republic, 3, 25
Reuben James, 76
 Reversing engines, 153
Robin Hood, 144
Robin Moor, 7, 46, 58, 62, 65, 105, 111
 abstract of voyage of #4
 lifeboat, 182-85
 Rockets, 26
 Rope belt, 143
 Rope lashings, 77
 Rough sea, sailing in, 58
 Rowing
 feathering oars, 43
 in double-banked boat, 43
 in heavy sea, 43
 proper method, 43
 stroke oar, 43
Rubilene, 77
 Rudder, 12, 34
Saber, 10

- Safety gear, 5
- Sail
 - adding to, 54
 - collecting water with, 112
 - dipping lug, 56
 - how to change lug to sprit, 129
 - reef, 55
 - setting, 48
- Sail bag, 54
- Sailing in following sea, 56
- Salmon, 121
- Salt-water soap, 27
- SAMPSON, NORMAN LEO, 22
- Sand
 - stowage, 142
- Santa Anna*, 69
- SCHUTZ, WILLIAM R., 143
- SCHWARTZ, JULIUS L., 12
- SCOTT, WILLIAM, 163
- Screens
 - engine-room, 153
- Scurvy, 123
- Sea anchor, 44, 57, 76
 - how to make, 52
- Sea water
 - effect of drinking, 113
 - freezing to get fresh water, 114
 - salt in, 113
- Seal, 140
- Seamanship
 - importance of practice, 15
 - open-boat, 55
- Seaweed, 119, 122
- SEILHAN, JAMES W., 154
- Self-control, 27
- Setting sail, 48
- Sextant, stowage of, 54
- Shaft alley
 - escape through, 153
- Shark, 21, 119, 158-59
- SHAW, CAROL, 179
- Sheave, 48
- Sheet, 58
- Shellfire, 72
- Shellfish, 119
- SHERLOCK, JAMES, 30
- Ship's meetings, 14
- Ships
 - lost in 1917, 17
 - lost in peacetime, 17
- Shock, 72, 93, 94
- Shrapnel, 87
 - wounds from, 91
- Signals, xii
 - flag, 169-70
 - smoke, 170
- SILVER, ANGEL, 154
- Sinking time, 32
- Skates, 6, 39
- SKWARKO, STEPHEN, 151
- Slackness, 16
- SLIVJAK, VINCENT A., 11
- SMITH, JOHN J., 14, 82, 85
- SMITH, LEONARD, 30
- Smoke, 150
- Sodium bicarbonate solution, 96
- Soldiers at sea, 69
- Spigots
 - removal of, 142
- Spreaders, 54
- Spritsail, 127-30
- Squalls, 51, 130
 - sailing in, 57
- St. Paul Rocks, 182
- STANISKY, SIGMAN, 151
- Steering oar, 53, 81, 142
- Sterilizing a knife, 91
- Stern fast, 39
- Storm, handling boat in, 55
- Storm oil, 39, 59
- Stretchers, 23
- Strongback, 34
- STUMPF, JOSEPH, 154
- Suction, 20
 - from propellers, 44, 73
- Suet stew, 121
- Suicide, 105
- Sulfadiazine tablets
 - for victim, 100
- Sulfanilamide, 87
 - powder, 91, 92

- Sulfathiazole tablets, 91
- Sunburn, 97
- Sunburn lotions, 98
- SUNDBY, HANS, 20, 22
- Sunshine
 - safe time of exposure to, 97
- Sunstroke, 98, 99
- Surf, rowing through, 60
- SUYDAM, VERNON A., 158
- SWANK, WALTER, 18
- Swimming
 - in flames, 84
 - in oil slick, 82
- Swinging out
 - boats on high side, 35
 - boats on low side, 36
- Tacoma*, 61
- Tanker rafts, 73
- Tankers
 - ballasted, 155
 - boat cover protection, 85
 - danger of cork jackets for tankermen, 83
 - escaping from flames, 83
 - explosions on, 155
 - gasfreeing tanks on, 157
 - ladder, 80
 - lifeboat capacity, 80
 - lifeboats should be inboard, 79
 - liferrafts, 81
 - lowering boats, 80, 85
 - oarlocks for boats, 81
 - oil slick, 83
 - overboard discharge, danger from, 81
 - painter, 80
 - radio shack on, 86
 - raft releasing gear, 81
 - raft skids, 81
 - sheaf knives for crew, 84
 - steering oar for boats, 81
 - washing decks on, 155
- Tannic acid, 96
- TAPSCOTT, ROBERT, 112
- TAYLOR, GEORGE, 145
- TAYLOR (*Robin Moor*), 182
- Tenon, 53
- Textbook, 15
- Theobromine, 118
- Thirst
 - artificial, 110
 - effect of fatty foods on, 114
 - temporary relief from, 111
 - true, 110
- THOMPSON, WILLIAM, 160
- Thwarts, 54
- TIDWELL, JOSEPH PAUL, 76
- Tiller, 55
 - made from spreaders, 54
- Time for escape, 26
- Time graph for 100 torpedoings, 180-81
- Toggle, 37
 - attaching, 142
- Toilet paper, 26
- Tomatoes, 25
- Toothbrush, 104
- Torpedo
 - fumes, 83
 - blast, 175-76
 - time graph of hits, 180-181
 - wake, 151
- Tourniquet, 88, 90
- Traction, 92
- Trade winds, 125
- Transports, troop
 - casualties on, 68
 - correcting list on, 72
 - knowing your quarters, 70
 - life preservers, 71
 - lifeboats, 71
 - lifelines, 71
 - liferrafts, 71
 - lowering lifeboats, 71
 - officers on, 70
 - orders in disaster, 70
 - position when abandoned, 69
 - rations, 71
 - shellfire, 72
- True course, 63
- Turnbuckles, 12

- Turnips, 25
Tuscania, 68
- Ulysses*, 82
 Underwear, 13, 71
 Urine, danger of drinking, 113
- VANDERSLOT, CORNELIUS, 160, 179
 Variation, 64
 Vegetables, 25
 water content of, 112
 Ventilators, 148
Vestris, 36, 39
 Vitamin A, 123
 Vitamin deficiencies, 122
 VORBERG, Capt. ERLING, 11
 VOSS, PAUL, 75
- W. E. Hutton*, 82
 WALLACE, R. G., 12
 Watches, 49
 Water
 by freezing, 165
 charged, 102
 distilling, 166
 effects of going without, 110
 estimating supply, 50
 from body fats, 114
 from coconuts, 161
 from coral reefs, 161
 from field ice, 115
 from fish, 115
 from icebergs, 115
 from sea water ice, 114, 165
 from sprouts, 161
 Goetz bag, 165
- Water (*Cont.*)
 how to freshen, 102
 in compass, 51
 in different vegetables, 112
 rain, collecting, 50, 77
 rationing, 50
 rust, effect of drinking, 115
 salt, effect of drinking, 113
 size of rations, 113
 storing, 51
 Water breaker, 50, 113
 caring for in cold weather, 136
 Water tanks, 12
 Weather
 squally, 57
 wind, 57
 Wedges, 54
 WELMANN, RUDOLPH C., 21
 Westerlies, 128
 Whistle, 23
 WHYTE, JAMES A., 179
 WILCOX, CHARLES A., 144-45
 Winds, 63
 Beaufort scale of, 125
 limits of trades, 126-127
 monsoons, 127
 Roaring Forties, 128
 trade, 125
 veering, 57
 Westerlies, 128
 Windsail, of brattice cloth, 22
 Wire basket for wounded, 23
 Wounds
 abdominal, 91
 gunshot, shrapnel, 91
 WYNNE, JAMES, 175

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